Use these links to rapidly review the document
Table of Contents
MIRNA THERAPEUTICS, INC. Index to Financial Statements

Table of Contents

As filed with the Securities and Exchange Commission on August 24, 2015.

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

Mirna Therapeutics, Inc.
(Exact name of Registrant as specified in its charter)

Delaware	**2834**	**26-1824804**
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

2150 Woodward Street, Suite 100
Austin, TX 78744
(512) 901-0900
(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

Paul Lammers, M.D., M.Sc.
President & Chief Executive Officer
Mirna Therapeutics, Inc.
2150 Woodward Street, Suite 100
Austin, TX 78744
(512) 901-0900
(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

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Telephone: (650) 328-4600	**Telephone: (415) 315-6300**
Facsimile: (650) 463-2600	**Facsimile: (415) 315-6350**

Approximate date of commencement of proposed sale to the public:
As soon as practicable after the effective date of this Registration Statement.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box. o

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer o	Accelerated filer o	Non-accelerated filer ☒ (Do not check if a smaller reporting company)	Smaller reporting company o

CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered	Proposed maximum aggregate offering price(1)	Amount of registration fee(1)
Common Stock, $0.001 par value per share	$80,500,000	$9,355

(1) Estimated solely for the purpose of calculating the amount of the registration fee in accordance with Rule 457(o) under the Securities Act of 1933, as amended. Includes shares that the underwriters have the option to purchase.

The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment which specifically states that this Registration Statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933 or until the Registration Statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

Table of Contents

The information in this preliminary prospectus is not complete and may be changed. These securities may not be sold until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell these securities nor does it seek an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

Subject to completion, dated , 2015

PRELIMINARY PROSPECTUS

Shares

Common Stock

Mirna Therapeutics, Inc. is offering shares of common stock. This is our initial public offering and no public market currently exists for our shares. We have applied to list our common stock on The NASDAQ Global Market under the symbol "MIRN." We expect that the initial public offering price will be between $ and $ per share.

We are an "emerging growth company" as that term is defined under the federal securities laws and, as such, may elect to comply with certain reduced public company reporting requirements for this and future filings.

Investing in our common stock involves a high degree of risk. Before buying any shares, you should read carefully the discussion of the material risks of investing in our common stock under the heading "Risk Factors" starting on page 11 of this prospectus.

	Per share	Total
Public offering price	$	$
Underwriting discounts(1)	$	$
Proceeds, before expenses, to Mirna Therapeutics, Inc.	$	$

(1) See "Underwriting" for additional information regarding total underwriting compensation.

We have granted the underwriters the right to purchase up to additional shares of common stock. The underwriters can exercise this right at any time within 30 days after the date of this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The underwriters expect to deliver the shares of common stock to investors on or about , 2015.

Citigroup **Leerink Partners**

Oppenheimer & Co. **Cantor Fitzgerald & Co.**

The date of this prospectus is , 2015.

Table of Contents

We are responsible for the information contained in this prospectus. Neither we nor the underwriters have authorized anyone to provide you with information that is different from that contained in this prospectus or in any free writing prospectus we may authorize to be delivered or made available to you. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. We and the underwriters are offering to sell shares of common stock and seeking offers to buy shares of common stock only in jurisdictions where offers and sales are permitted. The information contained in this prospectus is accurate only as of the date on the front of this prospectus, regardless of the time of delivery of this prospectus or any sale of shares of our common stock.

Until , 2015 (the 25th day after the date of this prospectus), all dealers that effect transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to the dealers' obligation to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

Market, Industry and Other Data

This prospectus also contains estimates, projections and other information concerning our industry, our business and the markets for oncology therapeutics, including data regarding the estimated size of those markets, their projected growth rates and the incidence of certain medical conditions. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances that are assumed in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources. In some cases, we do not expressly refer to the sources from which this data are derived. In that regard, when we refer to one or more sources of this type of data in any paragraph, you should assume that other data of this type appearing in the same paragraph are derived from the same sources, unless otherwise expressly stated or the context otherwise requires.

Trademarks

Our logo used in this prospectus is subject to a trademark that is owned by us. This prospectus also includes trademarks, tradenames and service marks that are the property of other organizations. Solely for convenience, trademarks and tradenames referred to in this prospectus may appear without the ® and ™ symbols, but those references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or the right of the applicable licensor to these trademarks and tradenames.

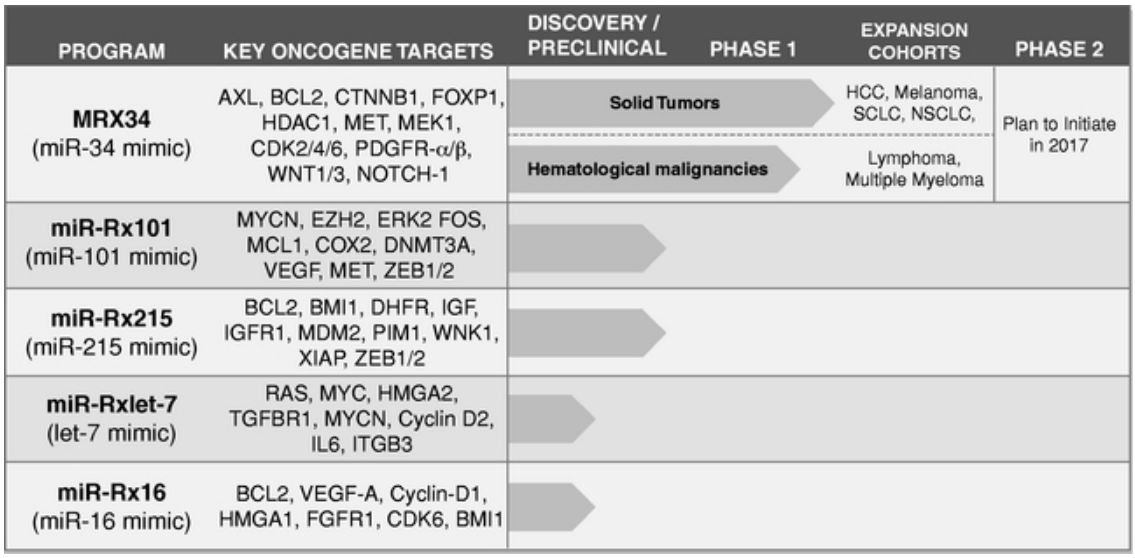
Prospectus Summary

This summary highlights information contained in other parts of this prospectus. Because it is only a summary, it does not contain all of the information that you should consider before investing in shares of our common stock and it is qualified in its entirety by, and should be read in conjunction with, the more detailed information appearing elsewhere in this prospectus. You should read the entire prospectus carefully, especially "Risk Factors," "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and the notes related thereto, before deciding to buy shares of our common stock. Unless the context requires otherwise, references in this prospectus to "Mirna," "we," "us" and "our" refer to Mirna Therapeutics, Inc.

Overview

We are a clinical-stage biopharmaceutical company developing a broad pipeline of microRNA-based oncology therapeutics. microRNAs are naturally occurring, short ribonucleic acid, or RNA, molecules, or oligonucleotides, that play a critical role in regulating key biological pathways. Misexpression of even a single microRNA can contribute to disease development and tumor suppressor microRNAs are commonly reduced in cancer. Our scientists and others at leading academic institutions have identified numerous tumor suppressor microRNAs that play key roles in preventing normal cells from becoming cancerous and facilitating proper cancer immunosurveillance. We are developing mimics of naturally occurring microRNAs that are designed to restore this tumor suppressor activity and aid appropriate tumor immune response. This approach is known as microRNA replacement therapy. Our lead product candidate, MRX34, a mimic of naturally occurring microRNA-34 (miR-34) encapsulated in a liposomal nanoparticle formulation, is the first microRNA mimic to enter clinical development and has shown preliminary clinical evidence of anti-tumor activity as a single agent in our ongoing Phase 1 clinical trial. miR-34 is one of the most widely published microRNAs and considered key regulator of oncogenic pathways. We plan to develop MRX34 as a monotherapy and in combination with other therapeutic modalities, such as targeted therapies and immuno-oncology agents. We believe that microRNA mimics represent a new paradigm in cancer therapy and have the potential to create a new, important class of effective cancer drugs, that can potentially be used alone or in combination with other cancer therapeutics.

We are developing a pipeline of tumor suppressor microRNA mimics, as shown in the following chart.



Each microRNA mimic in our pipeline is designed to replicate the activity of a single tumor suppressor miRNA and regulate the expression of multiple important oncogenes across key oncogenic pathways which can prevent proliferation and induce apoptosis in cancer cells. For example, we believe that the impressive anti-cancer activity of the miR-34 mimic in preclinical pharmacology studies is derived from its capacity to regulate more than 30 oncogenes, whereas many existing cancer therapies target only one or two oncogenes or pathways. The potential capacity to simultaneously affect multiple pathways and processes that are critical to cancer cell viability may make mimics of tumor suppressor microRNAs potent anti-cancer agents and less susceptible to drug resistance.

MRX34 is a potential first in class, first in clinic microRNA mimic which is currently in an ongoing Phase 1 study. Dose escalation in the Phase 1 clinical trial is expected to be completed by the end of 2015 and we plan to complete enrollment of several expansion cohorts and have multiple study data read-outs in different tumor types by the end of 2016.

In addition to evaluating the safety, tolerability and pharmacokinetic profile of MRX34, an important goal of our ongoing Phase 1 clinical trial is to establish proof of concept of microRNA replacement therapy in patients with primary liver cancer or advanced solid tumors. Our focus on hepatocellular carcinoma, or HCC, i based on the fact that liposomal nanoparticle formulations have a tendency to deliver their payload to the liver and the high unmet medical need in this tumor type. Fo example, sorafenib (Nexavar®), the only approved drug for unresectable primary liver cancer, has only shown a 2% objective response rate. Additionally, we have also demonstrated meaningful results with MRX34 in multiple mouse models of primary liver cancer, including a study in which MRX34 demonstrated improved survival over sorafenib. To date we have observed tumor shrinkage greater than 30% in two patients with Stage IV cancer: one patient with a confirmed partial response in primary liver cancer metastasized to the lung, and a confirmed partial response in a melanoma patient with disseminated disease.

During the course of our Phase 1 clinical trial, the patient population was expanded to also include patients with hematological malignancies, based on the observation that specific lymphomas and leukemias are characterized by low levels of miR-34 and biodistribution data that support high delivery to bone marrow and malignant lymphocytes. During the trial, we have observed dose-dependent MRX34 delivery and activity in normal white blood cells of patients and we aim to demonstrate delivery to tumors when patient biopsies become available during our expansion cohorts.

We are led by a management team with extensive experience in the biopharmaceutical industry. Members of our management team have played key roles at prio companies, including Bristol-Myers Squibb Company, Pfizer Inc., Reata Pharmaceuticals, Inc. and EMD Serono, Inc. Our principal investors are funds managed by Sofinnova Ventures, New Enterprise Associates, Pfizer Venture Investments, Eastern Capital, Baxalta, Santé Ventures, Morningside Ventures and Celgene. As of June 30, 2015, we had $41.6 million in cash and cash equivalents.

microRNAs: A Unique Class in the RNA Therapeutics Space

The landscape of RNA-based therapeutic technologies has rapidly expanded over the past few years, mostly due to advances in the delivery of these molecules t their intended targets. These new delivery technologies have enabled the use of microRNA mimics, which we believe provide stronger therapeutic activity than other RNA-based approaches. Since tumor suppressor microRNAs are natural molecules expressed in normal tissues and cells, we also believe that undesired, or so-called "off-target," side effects are less likely to be associated with our microRNA mimic approach.

While other companies in the field of microRNA have focused primarily on inhibiting overexpressed microRNAs by antagonists known as anti-miRs or AntagomiRs, we have focused on introducing microRNAs that are under-expressed in disease through the use of microRNA mimics. This is in part due to what we believe is stronger therapeutic activity of microRNA mimics compared to

anti-miRs or AntagomiRs. Within the group of companies in the microRNA space, we are the first company to clinically employ microRNA mimics.

microRNAs are misexpressed in a broad range of diseases including cancer, obesity, cardiovascular diseases, neurodegenerative diseases and viral infections. We believe that microRNA-based therapies have the potential to become a new class of drugs with broad therapeutic application due to their ability to modulate multiple disease pathways, target specificity which minimizes off-target effects, and their potential to work synergistically with other currently marketed drugs.

MRX34: Our Lead Product Candidate

We are the first to establish clinical proof-of-concept for a microRNA-based replacement therapy for cancer. Our lead microRNA-mimic product candidate, MRX34, is the potential first in a new class of promising cancer drugs, and has shown evidence of anti-tumor activity in a patient with metastasized hepatocellular carcinoma and a patient with advanced melanoma in our ongoing Phase 1 clinical trial. Once the dose-escalation phase in the ongoing Phase 1 trial has been completed, we intend to enroll additional patients across various tumor-specific expansion cohorts, including primary liver cancer, melanoma, small cell and non-sma cell lung cancer, lymphoma and multiple myeloma. We expect to complete these expansion cohorts and have multiple study data read-outs by the end of 2016. After consultation with the Food and Drug Administration, or FDA, on study results and the recommended clinical development program going forward, we intend to initiate a Phase 2 clinical trial program in early 2017.

MRX34 is a double-stranded RNA mimic of the tumor suppressor microRNA, miR-34, encapsulated in a liposomal nanoparticle formulation called SMARTICLES®. miR-34 inhibits multiple oncogenic pathways as well as stimulates anti-tumor immune response to induce cancer cell death. We performed cell culture studies that revealed that introducing a mimic of miR-34 into cancer cell lines derived from patients with liver, lung, colon, pancreatic and breast cancers results in significant reductions in cell proliferation. In various preclinical studies, miR-34 also inhibited formation of cancer stem cells, which are believed to contribute to the development, metastasis and therapeutic resistance of tumors. Studies performed at other laboratories have indicated that increasing miR-34 levels also inhibits the proliferation of cancer cells derived from patients with malignant melanoma, B-cell lymphoma and multiple myeloma.

MRX34 features an innovative liposomal formulation called SMARTICLES, which is used to deliver our miR-34 mimic to cancer cells. We selected SMARTICLES based on a number of identified efficacy and safety parameters during a comprehensive evaluation of more than 10 preclinical or clinical stage lipid- and polymer-based nanoparticle delivery technologies. Based on head-to-head preclinical comparisons and signs of clinical activity, we believe that the SMARTICLE technology currently offers the best combination of delivery and tolerability for our miRNA mimics.

In April 2013, we initiated a multi-center, open label dose escalation Phase 1 clinical trial during which we evaluated two different dosing schedules for MRX34 as a single agent in multiple advanced solid tumors and various types of hematological malignancies. As of August 13, 2015, 101 patients have been enrolled in the ongoing MRX34 Phase 1 clinical trial at five clinical trial sites in the United States and three sites in Korea. Primary objectives of the Phase 1 clinical trial are to establish the maximum tolerated dose and an appropriate dose for expansion cohorts and future Phase 2 clinical trials. As of August 13, 2015:

- 47 patients have been treated on a twice weekly, or BIW, schedule for three weeks in 28-day cycles until the maximum tolerated dose of MRX34 was found to be 110 mg/m^2 among patients with advanced solid tumors with liver involvement.

- The other 54 patients have been or are being treated daily for five days, or QD × 5, in 21-day cycles. We have not yet determined the maximum tolerated dose of MRX34 with this dosing schedule. Current dose levels are 70 mg/m^2 for primary liver cancer patients, 93 mg/m^2 for other solid tumors and 110 mg/m^2 for hematological malignancies.

Based on observations from the two dosing schedules, we believe the QD × 5 dosing schedule has certain advantages over the BIW schedule such as better safety and tolerability, which we believe may in turn lead to improved efficacy. Therefore, the QD × 5 dosing schedule has been selected for all new patients enrolling in the Phase 1 clinical trial.

Secondary objectives of the clinical trial are to assess the safety, tolerability and pharmacokinetic profile of MRX34 after intravenous dosing as well as to assess any biological and clinical activity. Many of the most common adverse events associated with MRX34 are similar to those reported with marketed liposomal drug formulations and have been generally manageable or preventable with standard interventions or tests used by oncologists. Biological activity has been demonstrated b dose-dependent down-regulation of target oncogenes of miR-34 and up-regulation of p21, a tumor suppressor induced by miR-34 in normal white blood cells from patients treated with MRX34. Signs of clinical activity have been demonstrated by the observation of confirmed partial responses in one patient with primary metastasized liver cancer and one patient with advanced melanoma per independent radiology review using RECIST (Response Evaluation Criteria in Solid Tumors) criteria.

Once the dose-escalation phase in the QD × 5 dose schedule cohort has been completed, and a recommended dose for the expansion cohorts has been determined we intend to enroll approximately 100 additional patients across different tumor-specific expansion cohorts, including primary liver cancer, melanoma, small cell and non-small cell lung cancer, lymphoma and multiple myeloma. We expect to complete these expansion cohorts and have multiple study data read-outs by the end of 2016. After consultation with the FDA on study results and recommended clinical development program going forward, we intend to initiate a Phase 2 clinical trial program in early 2017.

We have identified multiple tumor suppressor microRNAs that, like miR-34, have demonstrated the ability to inhibit cancer cell proliferation and tumor growth i preclinical studies. Each tumor suppressor miRNA regulates a unique set of genes and oncogenic pathways that we believe will enable the development of multiple therapeutic candidates either as monotherapies or as combination therapies. We plan to initiate a Phase 1 trial for our second therapeutic candidate in 2016.

We intend to continue building on our technology platform, comprised of intellectual property, proprietary methods and know-how in the field of microRNA, and also to successfully expand and defend our position as a leader in the field of microRNA. We are pursuing or have been granted therapeutic use patent claims related t several tumor suppressor microRNAs, as well as composition of matter claims for multiple chemistries and structures that are or may be used in or contemplated for use with our therapeutic microRNA mimics, including miR-34. We have an exclusive license to the patent estate covering the SMARTICLES liposomal delivery technology for four of our product pipeline candidates, including miR-34, which could be broadened to include certain other tumor suppressor microRNAs. We believ our strong intellectual property position can be used to support internal development as well as out-licensing opportunities.

Our Strategy

Key elements of our strategy are as follows:

- *Advance our lead product candidate, MRX34, through clinical development.*
- *Identify biomarkers to support therapeutic product candidates.*
- *Expand our clinical development program to additional microRNAs.*

- *Expand our intellectual property position.*

- *Leverage partnership opportunities.*

Risks Associated with Our Business

- We have incurred significant losses since inception. We anticipate that we will continue to incur significant losses for the foreseeable future, and if we are unable to achieve and sustain profitability, the market value of our common stock will likely decline. We will also need substantial additional funding. If we are unable to raise capital when needed, we could be forced to delay, reduce or terminate our product development, other operations or commercialization efforts.

- The approach we are taking to discover and develop novel therapeutics using microRNA is unproven and may never lead to marketable products.

- We are heavily dependent on the success of our lead product candidate, MRX34, which is in Phase 1 clinical development. If we are not successful in discovering, developing and commercializing additional product candidates, our ability to expand our business and achieve our strategic objectives would be impaired.

- Clinical drug development involves a lengthy and expensive process with an uncertain outcome, and results of earlier studies and trials may not be predictive of future trial results. Even if a product candidate does obtain regulatory approval, that product candidate may never achieve market acceptance or commercial success.

- We rely on third parties to conduct some of our nonclinical and all of our clinical trials as well as on single source third-party contract manufacturing organizations to manufacture and supply MRX34 and other product candidates for us. If these third parties do not successfully carry out their contractual duties or meet expected deadlines, we may face delays in the development and commercialization of our product candidates.

- If we are unable to obtain and maintain sufficient patent protection for our product candidates, or if the scope of the patent protection is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our produ candidates may be adversely affected.

- The patent rights of third parties may have an adverse effect on our business and may impact our ability to successfully commercialize one or more of our product candidates.

- We will need to increase the size of our organization, and we may experience difficulties in managing growth.

Our Corporate Information

We were incorporated in late 2007 under the laws of Delaware and were maintained as a wholly-owned subsidiary of our former parent company, Asuragen, Inc. until the end of 2009 when we became an independent entity. Our principal executive offices are located at 2150 Woodward St., Austin, TX 78744 and our telephone number is (512) 901-0900. Our website address is www.mirnarx.com. The information contained on, or that can be accessed through, our website is not part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

We are an emerging growth company as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. We will remain an emerging growth company until the earlier of the last day of the fiscal year following the fifth anniversary of the completion of this offering, the last day of the fiscal year in which we have total annual gross revenue of at least $1.0 billion, the date on which we are

deemed to be a large accelerated filer (this means the market value of our common stock that is held by non-affiliates exceeds $700 million at the end of the second quarter of that fiscal year), or the date on which we have issued more than $1.0 billion in nonconvertible debt securities during the prior three-year period. An emerging growth company may take advantage of specified reduced reporting requirements and is relieved of certain other significant requirements that are otherwise generally applicable to public companies. As an emerging growth company,

- we will avail ourselves of the exemption from the requirement to obtain an attestation and report from our auditors on the assessment of our internal control over financial reporting pursuant to the Sarbanes-Oxley Act of 2002;
- we will provide less extensive disclosure about our executive compensation arrangements; and
- we will not require shareholder non-binding advisory votes on executive compensation or golden parachute arrangements.

However, we are choosing to "opt out" of the extended transition periods available under the JOBS Act for complying with new or revised accounting standards. The decision to opt out of the extended transition periods under the JOBS Act is irrevocable.

The Offering

Issuer	Mirna Therapeutics, Inc.
Common stock we are offering	shares
Common stock to be outstanding after the offering	shares
Option to purchase additional shares	shares
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $ million, or approximately $ million if the underwriters exercise the option to purchase additional shares in full, at an assumed initial public offerin price of $ per share, the midpoint of the range set forth on the cover page of this prospectus, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. At June 30, 2015, we had cash and cash equivalents of $41.6 million. We currently estimate that we will use the net proceeds from this offering, together with our existing cash and cash equivalents, as follows: approximately $53.0 to $65.0 million to fund clinical development expenses for our lead program, MRX34, which includes approximately $13.0 to $17.0 million to complete the Phase 1 clinical trial, including expansion cohorts on multiple indications and/or changes in protocol approximately $14.0 to $18.0 million to initiate the Phase 2 clinical trial for an indication to be determined, and approximately $26.0 to $30.0 million to fund preclinical and clinical studies for the use of MRX34 in additional indications or in combination with standard of care drugs; and approximately $21.0 to $27.0 million to fund preclinical and clinical studies for a second product candidate using another to be determined mimic product. The remainder of the net proceeds from this offering, together with our existing cash and cash equivalents, will be used for preclinical studies, working capital and other general corporate purposes, which may include pursuit of our other research ar discovery efforts, expenditures on intellectual property and the acquisition or in-license of other products, product candidates or technologies. The amounts and timing of our actual expenditures may vary significantly depending on numerous factors, including the progress of our development, the status of and results from preclinical testing or clinical trials, as well as any collaborations that we may enter into with third parties for our product candidates, and any unforeseen cash needs. See "Use of Proceeds" on page 66 for a more complete description of the intended use of proceeds from this offering.
Risk factors	See "Risk Factors" beginning on page 11 and other information included in thi prospectus for a discussion of factors that you should consider carefully before deciding to invest in our common stock.
Symbol on The NASDAQ Global Market	"MIRN"

The number of shares of common stock to be outstanding after this offering is based on 153,801,422 shares of common stock outstanding at June 30, 2015, and excludes the following:

- 12,280,909 shares of common stock issuable upon the exercise of outstanding stock options at June 30, 2015 having a weighted-average exercise price of $0.37 per share;
- 2,264,241 shares of common stock reserved for issuance pursuant to future awards under our 2008 Long Term Incentive Plan, as amended, at June 30, 2015, which will become available for issuance under our 2015 Equity Incentive Award Plan after consummation of this offering; and
- shares of common stock reserved for issuance pursuant to future awards under our 2015 Equity Incentive Award Plan, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the consummation of this offering.

Unless otherwise indicated, the number of shares of our common stock described above gives effect to:

- the conversion of all 152,396,065 shares of our convertible preferred stock into an aggregate of 152,396,065 shares of common stock immediately prior to the consummation of this offering;
- the adoption of our amended and restated certificate of incorporation and amended and restated bylaws immediately prior to the consummation of this offering; and
- shares of common stock issuable to the holders of Series C convertible preferred stock and Series D convertible preferred stock under the terms of our certificate of incorporation as a result of the accruing paid-in-kind dividend in connection with the conversion of all shares of Series C convertible preferred stock and Series D convertible preferred stock into shares of common stock immediately prior to the consummation of this offering; and
- except as otherwise indicated, the assumption there will be no exercise of the underwriters' over-allotment option.

We refer to our Series A, Series B, Series B-1, Series C and Series D convertible preferred stock collectively as "convertible preferred stock" for financial reporting purposes and in the financial tables included in this prospectus, as more fully explained in Note 7 to our financial statements. In other parts of this prospectus, we refer to our Series A, Series B, Series B-1, Series C and Series D convertible preferred stock collectively as "preferred stock."

Summary Financial Data

The following tables set forth a summary of our historical financial data at, and for the period ended on, the dates indicated. The statement of operations data for the years ended December 31, 2012, 2013 and 2014 are derived from our audited financial statements included elsewhere in this prospectus. The statement of operations data for the six months ended June 30, 2014 and 2015 and balance sheet data as of June 30, 2015 have been derived from our unaudited financial statemen included elsewhere in this prospectus. Our unaudited financial statements are prepared on the same basis as our audited financial statements. You should read these data together with our audited financial statements and related notes appearing elsewhere in this prospectus and the information under the captions "Selected Financia Data" and "Management's Discussion and Analysis of Financial Condition and Results of Operations." Our historical results are not necessarily indicative of our futu results, and results for the six months ended June 30, 2015 are not necessarily indicative of results to be expected for the full year ending December 31, 2015.

	Year Ended December 31,			Six Months Ended June 30,	
	2012	2013	2014	2014	2015
	(in thousands, except share and per share data)			(unaudited)	
Statement of Operations Data:					
Operating expenses:					
Research and development	$ 2,742	$ 4,391	$ 10,545	$ 4,256	$ 7,924
General and administrative	1,562	2,384	3,369	1,777	2,039
Write-off of offering expenses	—	—	1,920	—	—
Total operating expenses	4,304	6,775	15,834	6,033	9,963
Other income (expense):					
Change in fair value of option liability	—	339	—	—	—
Gain on extinguishment of note payable	1,001	—	—	—	—
Interest expense	(355)	—	—	—	—
Net loss	$ (3,658)	$ (6,436)	$ (15,834)	$ (6,033)	$ (9,963)
Less: Accretion and dividends on convertible preferred stock	(6,142)	(2,324)	(2,824)	(1,400)	(2,662)
Net loss attributable to common stockholders	$ (9,800)	$ (8,760)	$ (18,658)	$ (7,433)	$ (12,625)
Net loss per share attributable to common stockholders, basic and diluted	$ (373.52)	$ (293.92)	$ (19.40)	$ (11.09)	$ (9.34)
Common shares used to compute basic and diluted net loss per share attributable to common stockholders	26,237	29,804	961,963	670,035	1,351,526
Pro forma net loss per common share (unaudited)—basic and diluted			$ (0.19)		$ (0.08)
Common shares used to compute pro forma net loss per share (unaudited)—basic and diluted			84,962,729		118,952,196

The table below presents our balance sheet data at June 30, 2015:

- on an actual basis;
- on a pro forma basis to give effect to:
  - the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 152,396,065 shares of common stock immediately prior to the consummation of this offering; and
  - the filing and effectiveness of our amended and restated certificate of incorporation, which will occur immediately prior to the consummation o this offering; and
- on a pro forma as adjusted basis to give further effect to:
  - the issuance and sale by us of shares of our common stock in this offering at an assumed initial public offering price of $ per shar (the midpoint of the range set forth on the cover page of this prospectus), after deducting the underwriting discounts and commissions and estimated offering expenses payable by us; and
  - the issuance of shares of common stock issuable to the holders of Series C convertible preferred stock and Series D convertible preferred stock under the terms of our certificate of incorporation as a result of the accruing paid-in-kind dividend in connection with the conversion of all shares of Series C convertible preferred stock and Series D convertible preferred stock into shares of common stock immediately prior to the consummation of this offering based on an assumed initial public offering price of $ per share (the midpoint of the range set forth on the cover page of this prospectus).

	At June 30, 2015		
	Actual	Pro Forma	Pro Forma As Adjusted(1)
	(in thousands)		
Balance Sheet Data:			
Cash and cash equivalents	$ 41,579	$ 41,579	
Total assets	42,187	42,187	
Total liabilities	3,096	3,096	
Convertible preferred stock	99,281	—	
Common stock	1	154	
Additional paid-in capital	—	99,128	
Accumulated deficit	(60,191)	(60,191)	
Total stockholders' (deficit) equity	(60,190)	39,091	

(1) Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, the midpoint of the range set forth on the cover page of this prospectus, would increase (decrease) each of pro forma as adjusted additional paid-in capital and stockholders equity by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same. We may also increase or decrease the number of shares we are offering. An increase (decrease) of 1,000,000 in the number of shares we are offering would increase (decrease) each of pro forma as adjusted additional paid-in capital, stockholders' equity and total capitalization by approximately $ million, assuming the assumed initial public offering price per share, as set forth on the cover page of this prospectus, remains the same.

Risk Factors

Investing in our common stock involves a high degree of risk. You should carefully consider the risks described below, as well as the other information in this prospectus and any related free writing prospectus, including our financial statements and the related notes and "Management's Discussion and Analysis of Financial Condition and Results of Operations," before deciding whether to invest in our common stock. The occurrence of any of the events or developments described below could harm our business, financial condition, results of operations and prospects. In such an event, the market price of our common stock could decline, and you may lose all or part of your investment. Additional risks and uncertainties not presently known to us or that we currently deem immaterial also may impair our business operations.

Risks Related to Our Limited Operating History, Financial Position and Capital Requirements

We have incurred significant losses since inception. We anticipate that we will continue to incur significant losses for the foreseeable future, and if we are unable to achieve and sustain profitability, the market value of our common stock will likely decline.

We are a clinical-stage biopharmaceutical company with a limited operating history. Biopharmaceutical product development is a highly speculative undertaking and involves a substantial degree of risk. We have not generated any product revenues and we do not expect to generate any product revenues for the foreseeable future. We have incurred losses in each year since our founding in 2007 and we expect to continue to incur significant operating losses for the foreseeable future. The amount of future losses is uncertain. All of our product candidates are in development, and none has been approved for sale. We have devoted substantially all of our efforts to research and development, including our preclinical and nonclinical development activities, and expect that it will be many years, if ever, before we have a product candidate ready for commercialization. To date, we have derived all of our funding from our collaboration with our former parent company, Asuragen, Inc., or Asuragen, private placements of preferred stock and government grants for research and development. Our net losses for the years ended December 31, 2012, 2013 and 2014 were $3.7 million, $6.4 million and $15.8 million, respectively, and $10.0 million for the six months ended June 30, 2015. Since inception, we have incurred net losses leading to an accumulated deficit of approximately $60.2 million as of June 30, 2015.

We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future as we continue our Phase 1 clinical trial of our lead product candidate, MRX34, pursue development of MRX34 for additional indications, conduct research and development of other product candidates and pursue marketing approval for MRX34 in the future. If we obtain marketing approval of MRX34, we also expect to incur significant sales, marketing, distribution and manufacturing expenses. Even after obtaining such marketing approval, our products may never gain sufficient market acceptance and adequate market share. If we fail to succeed in any of these activities or our product candidates fail to demonstrate safety and efficacy in clinical trials, do not gain regulatory approval or do not achieve significant market acceptance following regulatory approval and commercialization, we may never become profitable. Even if we achieve profitability in the future, we may not be able to sustain profitability in subsequent periods. Our prior losses, combined with expected future losses, have had and will continue to have an adverse effect on our stockholders' equity and working capital. If we are unable to achieve and sustain profitability, the market value of our common stock will likely decline. Because of the numerous risks and uncertainties associated with developing biopharmaceutical products, we are unable to predict the extent of any future losses or whether we will become profitable.

Our short operating history may make it difficult for you to evaluate the success of our business to date and to assess our future viability.

We are a clinical-stage biopharmaceutical company that was founded in 2007 and did not exist as a standalone company until 2009. Our operations to date have been limited to organizing and staffing our company, business planning, raising capital, acquiring and developing our technology, identifying and evaluating potential product candidates and delivery technologies, undertaking nonclinical studies, filing an Investigational New Drug, or IND, application with the U.S. Food and Drug Administration, or FDA, and conducting the Phase 1 clinical trial of our most advanced product candidate, MRX34. Except for MRX34, all of our product candidates are still in preclinical development. We have not yet demonstrated our ability to initiate clinical trials for product candidates other than MRX34, or successfully complete any clinical trials, including large-scale, pivotal clinical trials, obtain marketing approvals, manufacture a commercial scale medicine, or arrange for a third party to do so on our behalf, or conduct sales and marketing activities necessary for successful commercialization. Typically, it takes several years to develop one new product candidate from the time it is discovered to when it is available for treating patients. Consequently, any predictions about our future success or viability, or any evaluation of our business or prospects, may not be as accurate as they could be if we had a longer operating history. In addition, as a new business, we may encounter unforeseen expenses, difficulties, complications, delays and other known and unknown challenges. We will need to transition from a company with a research focus to a company capable of supporting commercial activities. We may not be successful in such a transition.

We will need substantial additional funding. If we are unable to raise capital when needed, we could be forced to delay, reduce or terminate our product development, other operations or commercialization efforts.

Developing biopharmaceutical products, including conducting preclinical and nonclinical studies and clinical trials, is an expensive and highly uncertain process that takes years to complete. Our expenses will increase substantially as we continue our Phase 1 clinical trial of our lead product candidate, MRX34, pursue development of MRX34 for additional indications, and conduct research and development of our other product candidates. Additional clinical trials, including one or more late-stage pivotal trials, will be required to obtain potential marketing approval for MRX34, and the costs of any future trials may be more expensive and time consuming than our current trial. If we obtain marketing approval of MRX34, we also expect to incur significant sales, marketing, distribution and outsourced manufacturing expenses.

As of June 30, 2015, we had working capital of $38.8 million and cash and cash equivalents of $41.6 million. Based on our current operating plan, we believe that our available cash and the proceeds from this offering are sufficient to fund our anticipated levels of operation for at least the next 12 months. Our future capital requirements for the period for which we expect our existing resources to support our operations may vary significantly from what we expect. For example, our expenses could increase beyond expectations if we are required by the FDA or comparable foreign regulatory agencies to perform studies and trials in addition to those that we currently anticipate. Our funds following this offering will not be sufficient to obtain marketing approval for MRX34. As a result, we will be required to obtain additional financing in the future, which we may obtain through public or private equity offerings, debt financings, a credit facility, government grants and contracts and/or strategic collaborations. If we are required to secure additional capital, such additional fundraising efforts may divert our management from our day-to-day activities, which may adversely affect our ability to develop and commercialize future product candidates. Additional financing may not be available to us when we need it or it may not be available to us on favorable terms, if at all. If we are unable to obtain adequate financing or form favorable collaborations, when needed, we may have to delay, reduce the scope of or eliminate one or more of our clinical trials, research and development programs or our commercialization efforts, including with respect to MRX34.

Additionally, our future financing requirements will depend on many factors, some of which are beyond our control, including:

- the demonstration of clinical proof-of-concept with our product candidates, including MRX34, in one or more cancer types or other indications;
- the rate of progress and cost of our clinical trials, preclinical and nonclinical studies and other discovery and research and development activities;
- the successful outcome of one or more pivotal clinical trials demonstrating safety and efficacy of our product candidates, including MRX34;
- the timing of, and costs involved in, seeking and obtaining FDA and other regulatory approvals;
- the costs of preparing, filing, prosecuting, maintaining and enforcing any patent claims and other intellectual property rights, including litigation costs and the results of such litigation;
- our ability to practice our technology without infringing the intellectual property rights of third parties;
- our ability to enter into additional collaboration, licensing, government or other arrangements and the terms and timing of such arrangements;
- the potential need to acquire, by acquisition or in-licensing, other products or technologies; and
- the emergence of competing technologies or other adverse market developments.

Future capital requirements will also depend on the extent to which we acquire or invest in additional complementary businesses, products and technologies. We currently have no understandings, commitments or agreements relating to any of these types of transactions.

Raising additional capital may cause dilution to our existing stockholders, restrict our operations or require us to relinquish rights to our technologies or product candidates.

Until such time, if ever, as we can generate substantial product revenues, we expect to finance our cash needs through public or private equity offerings, debt financings, credit facilities, government grants and contracts and/or strategic collaborations.

To raise capital, we may from time to time issue additional shares of common stock at a discount from the then-current trading price of our common stock. As a result, our common stockholders would experience immediate dilution upon the purchase of any shares of our common stock sold at such discount. In addition, as opportunities present themselves, we may enter into financing or similar arrangements in the future, including the issuance of debt securities, preferred stock or common stock. Whether or not we issue additional shares of common stock at a discount, any issuance of common stock will, and any issuance of other equity securities, securities convertible into equity securities or options, warrants or other rights to purchase common stock may, result in additional dilution of the percentage ownership of our stockholders and could cause our stock price to decline. New investors could also gain rights, preferences and privileges senior to those of holders of our common stock, which could cause the price of our common stock to decline. Debt securities may also contain covenants that restrict our operational flexibility, impose liens or other restrictions on our assets, restrict our ability to incur additional debt, impose limitations on our ability to acquire, sell or license intellectual property or impose other operating restrictions that could adversely affect our business and could also cause the price of our common stock to decline.

Other than our collaboration with our former parent company, Asuragen, and private placements of preferred stock, the only external source of funds to date has been state and federal government grants for research and development. The grants have been, and any future government grants and

contracts we may receive may be, subject to the risks and contingencies set forth below under the risk factor entitled "Reliance on government funding for our programs may add uncertainty to our research and commercialization efforts with respect to those programs that are tied to such funding and may impose requirements that limit our ability to take certain actions, increase the costs of commercialization and production of product candidates developed under those programs and subject us to potential financial penalties, which could materially and adversely affect our business, financial condition and results of operations." Although we apply for government and private contracts and grants, we cannot assure you that we will be successful in obtaining additional grants or contracts in the future for MRX34 or any other product candidates or programs.

Risks Related to Product Development and Commercialization

The approach we are taking to discover and develop novel therapeutics using microRNA is unproven and may never lead to marketable products.

The scientific discoveries that form the basis for our efforts to discover and develop new drugs are relatively recent. To date, neither we nor any other company has received regulatory approval to market therapeutics utilizing microRNA. The scientific evidence to support the feasibility of developing drugs based on these discoveries is both preliminary and limited. Successful development of microRNA-based products by us will require solving a number of issues, including providing suitable methods of stabilizing the microRNA material and delivering it into target cells in the human body. In addition, any compounds that we develop may not demonstrate in patients the chemical and pharmacological properties ascribed to them in laboratory and nonclinical studies, and they may interact with human biological systems in unforeseen, ineffective or even harmful ways. If we do not successfully develop and commercialize product candidates based upon our technological approach, we may not become profitable and the value of our common stock may decline.

Further, the FDA has relatively limited experience with microRNA-based therapeutics. No regulatory authority has granted approval to any person or entity, including us, to market and commercialize microRNA therapeutics, which may increase the complexity, uncertainty and length of the regulatory approval process for our product candidates. If our microRNA technologies prove to be ineffective, unsafe or commercially unviable, our entire pipeline would have little, if any, value, which would have a material adverse effect on our business, financial condition, results of operations and prospects.

Further, our exclusive focus on microRNA technology for developing products as opposed to multiple, more proven technologies for drug development increases the risk associated with our business. If we are not successful in developing a product candidate using microRNA technology, we may not be able to identify and successfully implement an alternative product development strategy.

We are heavily dependent on the success of our lead product candidate, MRX34, which is in Phase 1 clinical development.

We currently have no products approved for sale and have invested a significant portion of our efforts and financial resources in the development of MRX34. The clinical development of MRX34 began in April 2013 with a multi-center Phase 1 clinical trial that is currently enrolling patients with unresectable primary liver cancer or solid cancers. We have also expanded the Phase 1 clinical trial with a separate cohort of patients with hematological malignancies, which may include patients with non-Hodgkin's lymphoma, acute myelogenous leukemia, acute and chronic lymphocytic leukemia, chronic myelogenous leukemia in accelerated or blast phase, multiple myeloma and myelodysplastic syndrome. The primary objectives of the Phase 1 clinical trial, including the hematological malignancy cohort, are to establish the maximum tolerated dose and an appropriate dose for Phase 2 clinical trials. The secondary objectives of the Phase 1 clinical trial are to assess the safety, tolerability and

pharmacokinetic profile of MRX34 after intravenous dosing as well as to assess any biological and clinical activity.

Our prospects are substantially dependent on our ability to develop and commercialize MRX34. Our ability to timely develop and effectively commercialize MRX34 will depend on several factors, including the following:

- successful completion of our Phase 1 clinical trial or other clinical trials, which will depend substantially upon the satisfactory performance of third-party contractors;
- successful demonstration of clinical proof-of-concept with MRX34 in one or more Phase 2 clinical trials in one or more cancer types;
- successful outcome of one or more pivotal clinical trials required for regulatory approval demonstrating safety and efficacy of MRX34;
- receipt of marketing approvals for MRX34 from the FDA and similar regulatory authorities outside the United States;
- establishing commercial manufacturing capabilities, for example, by making arrangements with third-party manufacturers;
- successfully launching commercial sales of the product, whether alone or in collaboration with others;
- acceptance of the product by patients, the medical community and third-party payors;
- establishing market share while competing with other therapies;
- a continued acceptable safety and adverse event profile of the product following regulatory approval;
- qualifying for, identifying, registering, maintaining, enforcing and defending intellectual property rights and claims covering the product; and
- manufacturing, marketing, selling and using MRX34 and practicing our technology without infringing the proprietary rights of third parties, or successfully defending against claims alleging such infringement.

If we do not achieve one or more of these factors in a timely manner, or at all, we could experience significant delays or an inability to commercialize MRX34, which would materially and adversely affect our business, financial condition and results of operations.

We have not previously submitted a new drug application, or NDA, to the FDA, or similar drug approval filings to comparable foreign authorities, for any product candidate, and we cannot be certain that any of our product candidates will be successful in clinical trials or receive regulatory approval. Further, our product candidates may not receive regulatory approval even if they are successful in clinical trials. If we do not receive regulatory approvals for our product candidates, we may not be able to continue our operations. Even if we successfully obtain regulatory approvals to market one or more of our product candidates, our revenues will be dependent upon the size of the markets in the territories for which we gain regulatory approval and have commercial rights. If the markets for patient subsets that we are targeting are not as significant as we estimate, we may not generate significant revenues from sales of such products, if approved. Successful development of MRX34 or other product candidates for additional indications will be subject to these same risks.

If we are not successful in discovering, developing and commercializing additional product candidates, our ability to expand our business and achieve our strategic objectives would be impaired.

Although a substantial amount of our efforts will focus on the Phase 1 clinical trial and potential approval of our lead product candidate, MRX34, a key element of our strategy is to discover, develop and potentially commercialize a portfolio of product candidates to treat cancer and other indications. We are seeking to do so through our internal research programs and are exploring, and intend to explore in the future, strategic partnerships for the development of new products. Other than MRX34, all of our other potential product candidates remain in the discovery and preclinical study stages. Research programs to identify product candidates require substantial technical, financial and human resources, whether or not any product candidates are ultimately identified. Our research programs may initially show promise in identifying potential product candidates, yet fail to yield product candidates for clinical development for many reasons, including the following:

- the research methodology used may not be successful in identifying potential product candidates;
- competitors may develop alternatives that render our product candidates obsolete;
- product candidates we develop may nevertheless be covered by third parties' patents or other exclusive rights;
- a product candidate may, on further study, be shown to have harmful side effects or other characteristics that indicate it is unlikely to be effective or otherwise does not meet applicable regulatory criteria;
- a product candidate may not be capable of being produced in commercial quantities at an acceptable cost, or at all; and
- a product candidate may not be accepted as safe and effective by patients, the medical community or third-party payors.

If we are unsuccessful in identifying and developing additional product candidates, our potential for growth may be impaired.

We may use our financial and human resources to pursue a particular research program or product candidate and fail to capitalize on programs or product candidates that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and human resources, we may forego or delay pursuit of opportunities with certain programs or product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or more profitable market opportunities. Our spending on current and future research and development programs and future product candidates for specific indications may not yield any commercially viable products. We may also enter into strategic alliance agreements to develop and commercialize certain of our programs and potential product candidates in indications with potentially large commercial markets. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through strategic alliance, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate, or we may allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement.

The regulatory approval process is lengthy, expensive and uncertain, and we may be unable to obtain regulatory approval for our drug products under applicable regulatory requirements. The denial or delay of any such approval would delay commercialization of our drug products and adversely impact our ability to generate revenue, our business and our results of operations.

The development, research, testing, manufacturing, labeling, approval, selling, import, export, marketing and distribution of drug products are subject to extensive and evolving regulation by federal, state and local governmental authorities in the United States, principally the FDA, and by foreign regulatory authorities, which regulations differ from country to country. Neither we nor any future collaborator is permitted to market MRX34 or any other product candidate in the United States until we receive regulatory approval of an NDA from the FDA.

Obtaining regulatory approval of an NDA can be a lengthy, expensive and uncertain process. Prior to obtaining approval to commercialize a drug candidate in the United States or abroad, we or our collaborators must demonstrate with substantial evidence from well-controlled clinical trials, and to the satisfaction of the FDA or other foreign regulatory agencies, that such drug candidates are safe and effective for their intended uses. The number of nonclinical studies and clinical trials that will be required for FDA approval varies depending on the drug candidate, the disease or condition that the drug candidate is designed to address, and the regulations applicable to any particular drug candidate. Results from nonclinical studies and clinical trials can be interpreted in different ways. Even if we believe the nonclinical or clinical data for our drug candidates are promising, such data may not be sufficient to support approval by the FDA and other regulatory authorities. Administering drug candidates to humans may produce undesirable side effects, which could interrupt, delay or halt clinical trials and result in the FDA or other regulatory authorities denying approval of a drug candidate for any or all indications. The FDA may also require us to conduct additional studies or trials for our product candidates either prior to or post-approval, such as additional drug-drug interaction studies or safety or efficacy studies or trials, or it may object to elements of our clinical development program such as the number of subjects in our current clinical trials from the United States.

We expect the Phase 1 clinical trial for our lead product candidate, MRX34, to be completed by the end of 2016, and our business currently depends substantially on the successful development, regulatory approval and commercialization of MRX34. We currently have no drug products approved for sale, and we may never obtain regulatory approval to commercialize MRX34.

The FDA or any foreign regulatory bodies can delay, limit or deny approval of MRX34 or require us to conduct additional nonclinical or clinical testing or abandon a program for many reasons, including:

- the FDA or the applicable foreign regulatory agency's disagreement with the design or implementation of our clinical trials;
- negative or ambiguous results from our clinical trials or results that may not meet the level of statistical significance required by the FDA or comparable foreign regulatory agencies for approval;
- serious and unexpected drug-related side effects experienced by participants in our clinical trials or by individuals using drugs similar to our product candidates;
- our inability to demonstrate to the satisfaction of the FDA or the applicable foreign regulatory body that MRX34 is safe and effective for the proposed indication;
- the FDA's or the applicable foreign regulatory agency's disagreement with the interpretation of data from nonclinical studies or clinical trials;
- our inability to demonstrate the clinical and other benefits of MRX34 outweigh any safety or other perceived risks;

- the FDA's or the applicable foreign regulatory agency's requirement for additional nonclinical studies or clinical trials;
- the FDA's or the applicable foreign regulatory agency's disagreement regarding the formulation, labeling and/or the specifications of MRX34;
- the FDA's or the applicable foreign regulatory agency's failure to approve the manufacturing processes or facilities of third-party manufacturers with which we contract; or
- the potential for approval policies or regulations of the FDA or the applicable foreign regulatory agencies to significantly change in a manner rendering our clinical data insufficient for approval.

Of the large number of drugs in development, only a small percentage successfully complete the FDA or other regulatory approval processes and are commercialized. The lengthy approval process as well as the unpredictability of future clinical trial results may result in our failing to obtain regulatory approval to market MRX34, which would significantly harm our business, financial condition, results of operations and prospects.

Even if we eventually complete clinical testing and receive approval of an NDA or foreign marketing application for MRX34, the FDA or the applicable foreign regulatory agency may grant approval contingent on the performance of costly additional clinical trials, including Phase 4 clinical trials, and/or the implementation of a Risk Evaluation and Mitigation Strategy, or REMS, which may be required to ensure safe use of the drug after approval. The FDA or the applicable foreign regulatory agency also may approve MRX34 for a more limited indication or a narrower patient population than we originally requested, and the FDA or applicable foreign regulatory agency may not approve the labeling that we believe is necessary or desirable for the successful commercialization of MRX34. Any delay in obtaining, or inability to obtain, applicable regulatory approval would delay or prevent commercialization of MRX34 and would materially adversely impact our business and prospects.

Clinical drug development involves a lengthy and expensive process with an uncertain outcome, and results of earlier studies and trials may not be predictive of future trial results.

Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Furthermore, we rely on contract research organizations, or CROs, and clinical trial sites to ensure the proper and timely conduct of our clinical trials. While we have agreements with our CROs governing their committed activities, and the ability to audit their performance, we have limited influence over their actual performance. Failure or delay can occur at any time during the clinical trial process. Success in nonclinical testing and early clinical trials does not ensure that later clinical trials will be successful, and the results of clinical trials by other parties may not be indicative of the results in trials we may conduct. A number of companies in the pharmaceutical industry, including biotechnology companies, have suffered significant setbacks in clinical trials, even after promising results in earlier nonclinical or clinical studies. These setbacks have been caused by, among other things, nonclinical findings made while clinical studies were underway and safety or efficacy observations made in clinical studies, including previously unreported adverse events. The results of preclinical, nonclinical and early clinical studies of our product candidates may not be predictive of the results of later-stage clinical trials. Product candidates in later stages of clinical trials may fail to show the desired safety and efficacy traits despite having progressed through preclinical and initial clinical trials. Notwithstanding any potential promising results in earlier studies, we cannot be certain that we will not face similar setbacks. Even if our clinical trials are completed, the results may not be sufficient to obtain regulatory approval for our product candidates.

Although we have an ongoing Phase 1 clinical trial for MRX34 and expect to complete the unresectable primary liver cancer, solid tumors and hematological malignancy cohort portions of the

trial by the end of 2016, we may experience delays in our ongoing trial and we cannot be certain that the trial or any other future clinical trials for MRX34 or other product candidates will begin on time, need to be redesigned, enroll an adequate number of patients on time or be completed on schedule, if at all. Clinical trials can be delayed or aborted for a variety of reasons, including delay or failure related to:

- the FDA or comparable foreign regulatory authorities disagreeing as to the design or implementation of our clinical studies;
- obtaining regulatory approval to commence a trial;
- reaching agreement on acceptable terms with prospective CROs and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- obtaining institutional review board, or IRB, or equivalent approval at each site;
- recruiting suitable patients to participate in a trial;
- having patients complete a trial or return for post-treatment follow-up;
- clinical sites deviating from trial protocol or dropping out of a trial;
- addressing patient safety concerns that arise during the course of a trial;
- addressing any conflicts with new or existing laws or regulations;
- adding a sufficient number of clinical trial sites; or
- manufacturing sufficient quantities of product candidate for use in clinical trials.

Patient enrollment is a significant factor in the timing of clinical trials and is affected by many factors, including the size and nature of the patient population, the proximity of patients to clinical sites, the eligibility criteria for the trial, the design of the clinical trial, competing clinical trials and clinicians' and patients' perceptions as to the potential advantages of the drug being studied in relation to other available therapies, including any new drugs or treatments that may be approved for the indications we are investigating.

We could also encounter delays if a clinical trial is suspended or terminated by us, by the IRBs of the institutions in which such trials are being conducted, by the Data Safety Monitoring Board, or DSMB, for such trial or by the FDA or other regulatory authorities. Such authorities may suspend or terminate a clinical trial due to a number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by the FDA or other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from using a drug, changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial.

Further, conducting clinical trials in foreign countries, as we currently do for MRX34, presents additional risks that may delay completion of our clinical trials. These risks include the failure of enrolled patients in foreign countries to adhere to clinical protocol as a result of differences in healthcare services or cultural customs, managing additional administrative burdens associated with foreign regulatory schemes, as well as political and economic risks relevant to such foreign countries.

If we experience delays in the completion, or termination, of any clinical trial of our product candidates, the commercial prospects of our product candidates may be harmed, and our ability to generate product revenues from any of these product candidates will be delayed or not realized at all. In addition, any delays in completing our clinical trials will increase our costs, slow down our product

candidate development and approval process and jeopardize our ability to commence product sales and generate revenues. Any of these occurrences may significantly harm our business, financial condition and prospects. In addition, many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates.

If we are required to suspend or discontinue clinical trials due to side effects or other safety risks, or if we are required to conduct studies on the long-term effects associated with the use of MRX34 or other product candidates, our ability to commercialize our product candidates could be adversely affected.

Our clinical trials, including our Phase 1 clinical trial for MRX34, or other trials our strategic partners or CROs may conduct, may be suspended or terminated at any time for a number of safety-related reasons. For example, we may voluntarily suspend or terminate our clinical trials if at any time we believe that our product candidates present an unacceptable safety risk to the clinical trial patients. In addition, IRBs or regulatory agencies may order the temporary discontinuation or termination of our clinical trials at any time if they believe that the clinical trials are not being conducted in accordance with applicable regulatory requirements, including if they present an unacceptable safety risk to patients. Administering any product candidate to humans may produce undesirable side effects. The existence of undesirable side effects resulting from our product candidates could cause us or regulatory authorities, such as the FDA, to interrupt, delay or halt clinical trials of our product candidates and could result in the FDA or other regulatory agencies denying further development or approval of our product candidates for any or all indications.

We have not conducted complete studies on the long-term effects associated with the use of MRX34 or any other product candidate. Studies of these long-term effects may be required for regulatory approval and such requirement would delay our introduction of MRX34 or other product candidates into the market. These studies could also be required at any time after regulatory approval of a product candidate. Absence of long-term data may also limit the approved uses of a product, if any, to short-term use. MRX34 or any other product candidate may prove to be unsafe for human use, which would materially harm our business.

Certain oligonucleotide therapeutics and liposomal drug delivery products have shown injection site reactions, infusion reactions and pro-inflammatory effects and may also lead to impairment of organ function, including kidney or liver function. There is a risk that our current and future product candidates may induce similar adverse events, or require pre- or co-administration of other drugs to minimize such effects, which pre- or co-administration might adversely affect the benefits of our product or add additional side effects to the treatment regimens. Results of our clinical trials could reveal a high and unacceptable severity and prevalence of these or other side effects. In such an event, our trials could be suspended or terminated and the FDA or comparable foreign regulatory authorities could order us to cease further development of or deny approval of our product candidates for any or all indications. Drug-related side effects could affect patient recruitment or the ability of enrolled patients to complete the trial or result in potential product liability claims. Any of these occurrences may significantly harm our business, financial condition, results of operations and prospects significantly.

Our product candidates may cause undesirable side effects or have other properties that could delay or prevent their regulatory approval, limit the commercial profile of an approved label, or result in significant negative consequences following marketing approval, if any.

As with many pharmaceutical products and product candidates under development, MRX34 or our other potential product candidates may produce undesirable side effects or adverse reactions or events. In the event we or others identify undesirable side effects caused by one of our product candidates, any of the following adverse events could occur:

- we may be required, or we may decide, to halt or delay further clinical development of our product candidates;
- the FDA or comparable foreign regulatory authorities could order us to cease further development of or deny approval of our product candidates for any or all indications; or
- product-related side effects could affect patient recruitment or the ability of enrolled patients to complete the trial or result in potential product liability claims.

If MRX34 or our other potential product candidates receives marketing approval, and we or others later identify undesirable side effects caused by such products, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw their approval of the product;
- we may be required to recall a product or change the way such product is administered to patients;
- additional restrictions may be imposed on the marketing of the particular product or the manufacturing processes for the product or any component thereof;
- regulatory authorities may require the addition of labeling statements, such as a "black box" warning or a contraindication;
- we may be required to implement a REMS or create a Medication Guide outlining the risks of such side effects for distribution to patients;
- we could be sued and held liable for harm caused to patients;
- the product may become less competitive; and
- our reputation may suffer.

Any of the foregoing events could prevent us from achieving or maintaining market acceptance of the particular product candidate, if approved, and result in the loss of significant revenues to us, which would materially and adversely affect our results of operations and business.

Our clinical drug development program may not uncover all possible adverse events that patients who take MRX34 or other product candidates may experience. The number of subjects exposed to MRX34 or other product candidates and the average exposure time in the clinical development program may be inadequate to detect rare adverse events, or chance findings, that may only be detected once the product is administered to more patients and for greater periods of time.

Clinical trials by their nature utilize a sample of the potential patient population. However, with a limited number of subjects and limited duration of exposure, we cannot be fully assured that rare and severe side effects of MRX34 or other product candidates will be uncovered. Such rare and severe side effects may only be uncovered with a significantly larger number of patients exposed to the drug. If such safety problems occur or are identified after MRX34 or another product candidate reaches the

market, the FDA may require that we amend the labeling of the product or recall the product, or may even withdraw approval for the product.

We face potential product liability, and, if successful claims are brought against us, we may incur substantial liability and costs. If the use or misuse of our product candidates harms patients, or is perceived to harm patients even when such harm is unrelated to our product candidates, our regulatory approvals could be revoked or otherwise negatively impacted and we could be subject to costly and damaging product liability claims. If we are unable to obtain adequate insurance or are required to pay for liabilities resulting from a claim excluded from, or beyond the limits of, our insurance coverage, a material liability claim could adversely affect our financial condition.

The use or misuse of our product candidates in clinical trials and the sale of any products for which we obtain marketing approval exposes us to the risk of product liability claims. Product liability claims might be brought against us by consumers, healthcare providers, pharmaceutical companies or others selling or otherwise coming into contact with our products. There is a risk that our product candidates may induce adverse events. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. Certain oligonucleotide therapeutics and liposomal drug delivery products have shown injection site reactions, infusion reactions, and pro-inflammatory effects, and may also lead to organ dysfunction, including impairment of kidney or liver function. There is a risk that our future product candidates may induce similar adverse events. Patients with the diseases targeted by our product candidates are often already in severe and advanced stages of disease and have both known and unknown significant pre-existing and potentially life-threatening health risks. During the course of treatment, patients may suffer adverse events, including death, for reasons that may be related to our product candidates. Such events could subject us to costly litigation, require us to pay substantial amounts of money to injured patients, delay, negatively impact or end our opportunity to receive or maintain regulatory approval to market our products, or require us to suspend or abandon our commercialization efforts. Even in a circumstance in which we do not believe that an adverse event is related to our products, the investigation into the circumstance may be time-consuming or inconclusive. These investigations may interrupt our sales efforts, delay our regulatory approval process in other countries, or impact and limit the type of regulatory approvals our product candidates receive or maintain. As a result of these factors, a product liability claim, even if successfully defended, could have a material adverse effect on our business, financial condition or results of operations.

Although we have product liability insurance that we feel is appropriate for our stage of development, which covers our clinical trials in the United States, for up to $1 million per occurrence, up to an aggregate limit of $5 million, our insurance may be insufficient to reimburse us for any expenses or losses we may suffer, and we will be required to increase our product liability insurance coverage for our advanced clinical trials that we plan to initiate. We have obtained an additional product liability insurance policy for our planned clinical trials in the Republic of Korea. If and when we obtain marketing approval for product candidates, we intend to expand our insurance coverage to include the sale of commercial products. We do not know whether we will be able to continue to obtain product liability coverage and obtain expanded coverage if we require it, in sufficient amounts to protect us against losses due to liability, on acceptable terms, or at all. We may not have sufficient resources to pay for any liabilities resulting from a claim excluded from, or beyond the limits of, our insurance coverage. Where we have provided indemnities in favor of third parties under our agreements with them, there is also a risk that these third parties could incur liability and bring a claim under such indemnities. An individual may bring a product liability claim against us alleging that one of our product candidates or products causes, or is claimed to have caused, an injury or is found to be unsuitable for consumer use. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in the product, negligence, strict

liability, and a breach of warranties. Claims could also be asserted under state consumer protection acts. Any product liability claim brought against us, with or without merit, could result in:

- withdrawal of clinical trial volunteers, investigators, patients or trial sites or limitations on approved indications;
- the inability to commercialize, or if commercialized, decreased demand for, our product candidates;
- if commercialized, product recalls, withdrawals or labeling, marketing or promotional restrictions or the need for product modification;
- initiation of investigations by regulators;
- loss of revenues;
- substantial costs of litigation, including monetary awards to patients or other claimants;
- liabilities that substantially exceed our product liability insurance, which we would then be required to pay ourselves;
- an increase in our product liability insurance rates or the inability to maintain insurance coverage in the future on acceptable terms, if at all;
- the diversion of management's attention from our business; and
- damage to our reputation and the reputation of our products and our technology.

Product liability claims may subject us to the foregoing and other risks, which could have a material adverse effect on our business, financial condition, results of operations and prospects.

Currently, our product candidates are expensive to produce and are expensive relative to presently-marketed therapeutics targeting similar indications.

To date, our proposed product candidates have only been manufactured at a scale that is adequate to supply our research activities and early-stage clinical trials. As with many companies conducting Phase 1 clinical trials or preclinical studies on product candidates, the current cost of each treatment is expensive relative to presently-marketed therapeutics targeting similar indications. We cannot assure you that we will be able to scale the manufacturing of our products during future clinical trials or commercialization in order to achieve a treatment price that would allow for commercial acceptance. In the event our product candidates cannot be manufactured in sufficient commercial quantities at a competitive price, our future prospects could be significantly impacted and our financial prospects would be materially harmed.

Even if a product candidate does obtain regulatory approval, that product candidate may never achieve market acceptance or commercial success.

Even if we obtain FDA or other regulatory approvals, and are able to launch MRX34 or any other product candidate commercially, the product candidate may not achieve market acceptance among physicians, patients, patient advocacy groups and third-party payors and, ultimately, may not be commercially successful. Market acceptance of any product candidate for which we receive approval depends on a number of factors, including:

- the efficacy and safety of the product candidate as demonstrated in clinical trials;
- the clinical indications for which the product candidate is approved;
- acceptance by physicians, patients, operators of treatment facilities and parties responsible for reimbursement of the product candidate as a safe and effective treatment;

- the potential and perceived advantages of the product candidate, including the cost of treatment and benefits over alternative treatments;
- the safety of the product candidate seen in a broader patient group, including use outside the approved indications;
- the cost of treatment in relation to alternative treatments;
- the availability of adequate reimbursement and pricing by third-party payors and government authorities;
- relative convenience and ease of administration;
- the tolerance of the products by patients, including prevalence and severity of adverse side effects;
- the availability of the product and the ability to meet market demand; and
- the effectiveness of our sales and marketing efforts.

Any failure by MRX34 or any other product candidate that obtains regulatory approval to achieve market acceptance or commercial success would adversely affect our financial results.

Risks Related to Our Reliance on Third Parties

We rely on third parties to conduct some of our nonclinical and all of our clinical trials. If these third parties do not successfully carry out their contractual duties or meet expected deadlines, we may be unable to obtain regulatory approval for or commercialize any of our product candidates.

Although we conduct certain nonclinical studies, we currently do not have the ability to independently conduct nonclinical studies that comply with the regulatory requirements known as good laboratory practice, or GLP, requirements. We also do not currently have the ability to independently conduct any clinical trials. The FDA and regulatory authorities in other jurisdictions require us to comply with regulations and standards, commonly referred to as current good clinical practice, or GCP, requirements for conducting, monitoring, recording and reporting the results of clinical trials, in order to ensure that the data and results are scientifically credible and accurate and that the trial subjects are adequately informed of the potential risks of participating in clinical trials. We rely on medical institutions, clinical investigators, contract laboratories and other third parties, such as CROs, to conduct GLP-compliant nonclinical studies and GCP-compliant clinical trials on our product candidates properly and on time. While we will have agreements governing their activities, we control only certain aspects of their activities and have limited influence over their actual performance. The third parties with whom we contract for execution of our GLP nonclinical studies and our GCP clinical trials play a significant role in the conduct of these studies and trials and the subsequent collection and analysis of data. These third parties are not our employees and, except for restrictions imposed by our contracts with such third parties, we have limited ability to control the amount or timing of resources that they devote to our programs. Although we rely on these third parties to conduct our GLP-compliant preclinical and nonclinical studies and GCP-compliant clinical trials, we remain responsible for ensuring that each of our GLP preclinical and nonclinical studies and GCP clinical trials is conducted in accordance with its investigational plan and protocol and applicable laws and regulations, and our reliance on the CROs does not relieve us of our regulatory responsibilities.

Many of the third parties with whom we contract may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical trials or other drug development activities that could harm our competitive position. If the third parties conducting our GLP preclinical or nonclinical studies or our clinical trials do not perform their contractual duties or obligations, experience work stoppages, do not meet expected deadlines, terminate

their agreements with us or need to be replaced, or if the quality or accuracy of the clinical data they obtain is compromised due to their failure to adhere to our clinical trial protocols or to GCPs, or for any other reason, we may need to enter into new arrangements with alternative third parties. This could be difficult, costly or impossible, and our nonclinical studies or clinical trials may need to be extended, delayed, terminated or repeated. As a result we may not be able to obtain regulatory approval in a timely fashion, or at all, for the applicable product candidate, our financial results and the commercial prospects for our product candidates would be harmed, our costs could increase, and our ability to generate revenues could be delayed.

We rely on single source third-party contract manufacturing organizations to manufacture and supply MRX34 and other product candidates for us. If our supplier or manufacturer fails to perform adequately or fulfill our needs, or if these agreements are terminated by the third parties, we may be required to incur significant costs and devote significant efforts to find new suppliers or manufacturers. We may also face delays in the development and commercialization of our product candidates.

We do not currently independently conduct manufacturing activities for our product candidates, including MRX34. We rely upon single source third-party contract manufacturing organizations to manufacture and supply our product candidates. We currently have a relationship with only one supplier, NITTO DENKO Avecia, or Avecia, located in Massachusetts, for clinical supply of the drug substance for our miR-34 mimic. We are actively evaluating and qualifying a second-source supplier of our miR-34 mimic. We expect to complete this process in the second half of 2015. Polymun Scientific Immunbiologische Forschung GmbH, or Polymun, located in Austria, is the exclusive manufacturer of our MRX34 drug product. Further, we rely on our contract manufacturers to manage the supply chain for the raw materials used in the manufacture of the drug substance and drug product.

Any manufacturers of the drug substance and drug product for our product candidates must comply with current good manufacturing practice, or cGMP, requirements enforced by the FDA through its facilities inspection program. These requirements include, among other things, quality control, quality assurance and the maintenance of records and documentation. Manufacturers of our component materials may be unable to comply with these cGMP requirements and with other FDA, state and foreign regulatory requirements. We do not directly control the manufacturing process of, and are completely dependent on, our contract manufacturing partners for compliance with cGMPs. If our contract manufacturers cannot successfully manufacture material that conforms to our specifications and the strict regulatory requirements of the FDA or foreign regulatory agencies, they will not be able to secure and/or maintain regulatory approval for their manufacturing facilities. In addition, we have no direct control over the ability of our contract manufacturers to maintain adequate quality control, quality assurance and qualified personnel. The FDA or similar foreign regulatory agencies at any time may also implement new standards, or change their interpretation and enforcement of existing standards for manufacture, packaging or testing of products. We have little control over a manufacturer's compliance with these regulations and standards. However, a failure to comply with these requirements may result in fines and civil penalties, suspension of production, suspension or delay in product approval, product seizure or recall, or withdrawal of product approval. If the safety of any product supplied is compromised due to our manufacturer's failure to adhere to applicable laws or for other reasons, we may not be able to obtain regulatory approval for or successfully commercialize our products, and we may be held liable for any injuries sustained as a result. In addition, if the FDA or a comparable foreign regulatory agency does not approve our contract manufacturer's facilities for the manufacture of our product candidates or if it withdraws its approval in the future, we may need to find alternative manufacturing facilities, which would negatively impact our ability to develop, obtain regulatory approval for, or market our product candidates, if approved. Any of these factors could cause a delay of clinical trials, regulatory submissions, approvals or commercialization of our product candidates or entail higher costs or impair our reputation.

The manufacture of pharmaceutical products in compliance with cGMP regulations requires significant expertise and capital investment, including the development of advanced manufacturing techniques and process controls. Manufacturers of pharmaceutical products often encounter difficulties in production, including difficulties with production costs and yields, quality control, including stability of the product candidate and quality assurance testing, or shortages of qualified personnel. If our manufacturers were to encounter any of these difficulties or otherwise fail to comply with their obligations to us or under applicable regulations, our ability to provide study materials in our nonclinical studies and clinical trials would be jeopardized. Any delay or interruption in the supply of nonclinical study or clinical trial materials could delay the completion of our nonclinical studies and clinical trials, increase the costs associated with maintaining our nonclinical study and clinical trial programs and, depending upon the period of delay, require us to conduct nonclinical studies, commence new trials at significant additional expense or terminate the studies and trials completely.

We currently believe that our third party suppliers have the necessary expertise to produce our MRX34 drug substance and drug product in sufficient quantity and of acceptable quality to support our development program through at least Phase 3 clinical trials and possibly through commercialization of MRX34. However, our current agreements with our suppliers do not provide for the entire supply of the drug necessary for additional clinical trials or for full-scale commercialization. In the event that we and our suppliers cannot agree to the terms and conditions for them to provide some or all of our clinical and commercial drug supply needs, or if our suppliers terminate their agreements with us in response to a breach by us or any other reason permitted under our agreements, we would not be able to manufacture the drug on a commercial scale until a qualified alternative supplier is identified, which could also delay the development of, and impair our ability to commercialize, our product candidates. Any supplier would be required to obtain regulatory approval of their manufacturing facilities, processes and quality systems before engaging in the commercial manufacture of a pharmaceutical product. Due to the complexity of the processes used to manufacture pharmaceutical products and product candidates, any potential third-party manufacturer may be unable to continue to pass or initially pass federal, state or international regulatory inspections in a cost-effective manner.

Although we believe that appropriate alternative sources of supply exist for each of our current product candidates, the number of third-party suppliers with the necessary manufacturing and regulatory expertise and facilities is limited, and it could be expensive and take a significant amount of time to arrange for alternative suppliers, which could have a material adverse effect on our business. New suppliers of any drug would be required to qualify under applicable regulatory requirements and would need to have sufficient rights under applicable intellectual property laws to the method of manufacturing such ingredients. Obtaining the necessary FDA approvals or other qualifications under applicable regulatory requirements and ensuring non-infringement of third- party intellectual property rights could result in a significant interruption of supply and could require the new manufacturer to bear significant additional costs which may be passed on to us.

The failure of third-party manufacturers or suppliers to perform adequately or the termination of our arrangements with any of them may negatively and adversely affect our business.

Reliance on third-party manufacturers entails risks to which we would not be subject if we manufactured the product candidates ourselves, including:

- the inability to meet any product specifications and quality requirements consistently;
- a delay or inability to procure or expand sufficient manufacturing capacity;
- capacity related to the scale-up of manufacturing;
- manufacturing and product quality issues related to scale-up of manufacturing;
- costs and validation of new equipment and facilities required for scale-up;

- a failure to comply with cGMP and similar foreign standards;
- operations of our third-party manufacturers or suppliers could be disrupted by conditions unrelated to our business or operations, including the bankruptcy of the manufacturer or supplier;
- carrier disruptions or increased costs that are beyond our control;
- the failure of third parties involved in the transportation, storage and distribution of our products, including the failure to deliver products under specified storage conditions and in a timely manner; and
- the possibility that our contract manufacturer, or third parties with access to their facilities, will have access to and may appropriate our trade secrets or other proprietary information.

Any of these events could lead to clinical trial delays or failure to obtain regulatory approval, or impact our ability to successfully commercialize future products. Some of these events could be the basis for FDA action, including injunction, recall, seizure or total or partial suspension of production.

We may not be able to develop or identify a technology that can effectively deliver our miR-34 mimic or any other of our microRNA-based product candidates to the intended diseased cells or tissues, and any failure in such delivery technology could adversely affect and delay the development of MRX34 and our other product candidates.

In connection with our Phase 1 clinical trial of MRX34, we have used a SMARTICLES liposomal formulation to facilitate delivery to tumors. SMARTICLES has demonstrated successful tumor delivery of our miR-34 mimic in multiple mouse models of liver cancer, but we cannot be certain that the SMARTICLES technology will be capable of delivering adequate levels of our miR-34 mimic to liver tumors in patients to produce a therapeutic response. While we believe SMARTICLES could be used to deliver mimics in additional indications, future clinical testing could reveal that the efficacy of SMARTICLES is limited to delivery to liver cancer cells. While we are continuing to evaluate the use of SMARTICLES in other indications, and additional delivery technologies that might enable us to target other cells with our product candidates, we cannot be certain whether we will be successful in developing such alternative delivery mechanisms. Our failure to effectively deliver any of our product candidates to the intended diseased cells or tissues could adversely affect and delay the development of our product candidates.

We currently have no sales and marketing staff or distribution organization. If we are unable to develop a sales and marketing and distribution capability on our own or through third parties, we will not be successful in commercializing our future products.

We currently have no sales, marketing or distribution capabilities or experience. To achieve commercial success for any approved product candidate, we must either develop a sales, marketing and distribution organization or outsource these functions to third parties. If we rely on third parties for marketing and distributing our approved products, any revenue we receive will depend upon the efforts of third parties, which may not be successful and are only partially within our control and our product revenue may be lower than if we directly marketed or sold our products. If we are unable to enter into arrangements with third parties to sell, market and distribute product candidates for which we have received regulatory approval on acceptable terms or at all, we will need to market these products ourselves. This is likely to be expensive and logistically difficult, as it would require us to build our own sales, marketing and distribution capacity. We have no experience in this area, and if such efforts were necessary, we may not be able to successfully commercialize our future products. If we are not successful in commercializing our future products, either on our own or through third parties, any future product revenue will be materially and adversely affected.

We may attempt to form collaborations in the future with respect to our product candidates, but we may not be able to do so, which may cause us to alter our development and commercialization plans.

We may attempt to form strategic alliances, create joint ventures or collaborations or enter into licensing arrangements with third parties with respect to our programs that we believe will complement or augment our existing business. For example, we may attempt to find a strategic partner for the development and/or commercialization of MRX34. We may face significant competition in seeking appropriate strategic partners, and the negotiation process to secure appropriate terms is time-consuming and complex. We may not be successful in our efforts to establish such a strategic partnership for any product candidates and programs on terms that are acceptable to us, or at all. This may be because our product candidates and programs may be deemed to be at too early of a stage of development for collaborative effort, our research and development pipeline may be viewed as insufficient, the competitive or intellectual property landscape may be viewed as too intense or risky, and/or third parties may not view our product candidates and programs as having sufficient potential for commercialization, including the likelihood of an adequate safety and efficacy profile.

Any delays in identifying suitable collaborators and entering into agreements to develop and/or commercialize our product candidates could delay the development or commercialization of our product candidates, which may reduce their competitiveness even if they reach the market. Absent a collaboration partner, we would need to undertake development and/or commercialization activities at our own expense. If we elect to fund and undertake development and/or commercialization activities on our own, we may need to obtain additional expertise and additional capital, which may not be available to us on acceptable terms or at all. If we are unable to do so, we may not be able to develop our product candidates or bring them to market and our business may be materially and adversely affected.

We may be unable to realize the potential benefits of any collaboration.

Even if we are successful in entering into a collaboration with respect to the development and/or commercialization of one or more product candidates, there is no guarantee that the collaboration will be successful. Collaborations may pose a number of risks, including:

- collaborators often have significant discretion in determining the efforts and resources that they will apply to the collaboration, and may not commit sufficient resources to the development, marketing or commercialization of the product or products that are subject to the collaboration;
- collaborators may not perform their obligations as expected;
- any such collaboration may significantly limit our share of potential future profits from the associated program, and may require us to relinquish potentially valuable rights to our current product candidates, potential products or proprietary technologies or grant licenses on terms that are not favorable to us;
- collaborators may cease to devote resources to the development or commercialization of our product candidates if the collaborators view our product candidates as competitive with their own products or product candidates;
- disagreements with collaborators, including disagreements over proprietary rights, contract interpretation or the course of development, might cause delays or termination of the development or commercialization of product candidates, and might result in legal proceedings, which would be time-consuming, distracting and expensive;
- collaborators may be impacted by changes in their strategic focus or available funding, or business combinations involving them, which could cause them to divert resources away from the collaboration;

- collaborators may infringe the intellectual property rights of third parties, which may expose us to litigation and potential liability;
- the collaborations may not result in us achieving revenues to justify such transactions; and
- collaborations may be terminated and, if terminated, may result in a need for us to raise additional capital to pursue further development or commercialization of the applicable product candidate.

As a result, a collaboration may not result in the successful development or commercialization of our product candidates.

Reliance on government funding for our programs may add uncertainty to our research and commercialization efforts with respect to those programs that are tied to such funding and may impose requirements that limit our ability to take certain actions, increase the costs of commercialization and production of product candidates developed under those programs and subject us to potential financial penalties, which could materially and adversely affect our business, financial condition and results of operations.

During the course of our development of our product candidates, we have been funded in significant part through federal and state grants, including but not limited to the substantial funding we have received from the Texas Emerging Technology Fund and the Cancer Prevention & Research Institute of Texas, or CPRIT. In addition to the funding we have received to date, we have applied and intend to continue to apply for federal and state grants to receive additional funding in the future. Contracts and grants funded by the U.S. government, state governments and their related agencies, including our contracts with the State of Texas pertaining to funds we have already received, include provisions that reflect the government's substantial rights and remedies, many of which are not typically found in commercial contracts, including powers of the government to:

- require repayment of all or a portion of the grant proceeds, in certain cases with interest, in the event we violate certain covenants pertaining to various matters that include any potential relocation outside of the State of Texas, failure to achieve certain milestones or to comply with terms relating to use of grant proceeds, or failure to comply with certain laws;
- terminate agreements, in whole or in part, for any reason or no reason;
- reduce or modify the government's obligations under such agreements without the consent of the other party;
- claim rights, including intellectual property rights, in products and data developed under such agreements;
- audit contract-related costs and fees, including allocated indirect costs;
- suspend the contractor or grantee from receiving new contracts pending resolution of alleged violations of procurement laws or regulations;
- impose U.S. manufacturing requirements for products that embody inventions conceived or first reduced to practice under such agreements;
- impose qualifications for the engagement of manufacturers, suppliers and other contractors as well as other criteria for reimbursements;
- suspend or debar the contractor or grantee from doing future business with the government;
- control and potentially prohibit the export of products;

- pursue criminal or civil remedies under the False Claims Act, False Statements Act and similar remedy provisions specific to government agreements; and

- limit the government's financial liability to amounts appropriated by the U.S. Congress on a fiscal-year basis, thereby leaving some uncertainty about the future availability of funding for a program even after it has been funded for an initial period.

In addition to those powers set forth above, the government funding we may receive could also impose requirements to make payments based upon sales of our products in the future. For example, under the terms of our award from CPRIT, we are required to pay CPRIT a portion of our revenues from sales of certain products by us, or received from our licensees or sublicensees, at a percentage in the low single digits until the aggregate amount of such payments equals a specified multiple of the grant amount, and thereafter at a rate of less than one percent, subject to our right, under certain circumstances, to make a one-time payment in a specified amount to CPRIT to buy out such payment obligations. See "Business—Strategic Partnerships and Collaborations" for a description of the CPRIT agreement, which includes a description of our obligations to make royalty payments.

We may not have the right to prohibit the U.S. government from using certain technologies developed by us, and we may not be able to prohibit third-party companies, including our competitors, from using those technologies in providing products and services to the U.S. government. The U.S. government generally takes the position that it has the right to royalty-free use of technologies that are developed under U.S. government contracts. These and other provisions of government grants may also apply to intellectual property we license now or in the future.

In addition, government contracts and grants normally contain additional requirements that may increase our costs of doing business, reduce our profits, and expose us to liability for failure to comply with these terms and conditions. These requirements include, for example:

- specialized accounting systems unique to government contracts and grants;

- mandatory financial audits and potential liability for price adjustments or recoupment of government funds after such funds have been spent;

- public disclosures of certain contract and grant information, which may enable competitors to gain insights into our research program; and

- mandatory socioeconomic compliance requirements, including labor standards, non-discrimination and affirmative action programs and environmental compliance requirements.

If we fail to maintain compliance with any such requirements that may apply to us now or in the future, we may be subject to potential liability and to termination of our contracts.

Our business involves the use of hazardous materials and we and our third- party manufacturers must comply with environmental laws and regulations, which may be expensive and restrict how we do business.

Our third-party manufacturers' activities and our own activities involve the controlled storage, use and disposal of hazardous materials, including the components of our pharmaceutical product candidates, test samples and reagents, biological materials and other hazardous compounds. We and our manufacturers are subject to federal, state, local and foreign laws and regulations governing the use, generation, manufacture, storage, handling and disposal of these hazardous materials. We currently carry no insurance specifically covering environmental claims relating to the use of hazardous materials. Although we believe that our safety procedures for handling and disposing of these materials and waste products comply with the standards prescribed by these laws and regulations, we cannot eliminate the risk of accidental injury or contamination from the use, storage, handling or disposal of hazardous materials. In the event of an accident, state or federal or other applicable authorities may curtail our use of these materials and/or interrupt our business operations. In addition, if an accident or

environmental discharge occurs, or if we discover contamination caused by prior operations, including by prior owners and operators of properties we acquire, we could be liable for cleanup obligations, damages and fines. If such unexpected costs are substantial, this could significantly harm our financial condition and results of operations.

Risks Related to Administrative, Organizational and Commercial Operations and Growth

We will need to increase the size of our organization, and we may experience difficulties in managing growth.

As of June 30, 2015, we had 24 employees. We may need to expand our managerial, operational, financial and other resources in order to manage our operations and clinical trials, continue our development activities and commercialize MRX34 or other product candidates. Our management and personnel, systems and facilities currently in place are likely not adequate to support this future growth. Also, our management may need to divert a disproportionate amount of its attention away from our day-to-day activities and devote a substantial amount of time to managing these growth activities. We may not be able to effectively manage the expansion of our operations, which may result in weaknesses in our infrastructure and give rise to operational mistakes, loss of business opportunities, loss of employees and reduced productivity among remaining employees. Our expected growth could require significant capital expenditures and may divert financial resources from other projects, such as the development of additional product candidates. Our need to effectively execute our business strategy requires that we:

- manage our Phase 1 clinical trial, which is being conducted at multiple trial sites, as well as manage any other clinical trials in the future;
- manage our internal development efforts effectively while carrying out our contractual obligations to licensors, contractors, government agencies, any future collaborators and other third parties;
- continue to improve our operational, financial and management controls, reporting systems and procedures; and
- identify, recruit, maintain, motivate and integrate additional employees.

If we are unable to expand our managerial, operational, financial and other resources to the extent required to manage our development and commercialization activities, our business will be materially adversely affected.

We face substantial competition and our competitors may discover, develop or commercialize products faster or more successfully than us.

The development and commercialization of new drug products is highly competitive. We face competition from major pharmaceutical companies, specialty pharmaceutical companies, biotechnology companies, universities and other research institutions worldwide with respect to MRX34 and other product candidates that we may seek to develop or commercialize in the future. Our competitors may succeed in developing, acquiring or licensing technologies and drug products that are more effective or less costly than MRX34 or any other product candidates that we are currently developing or that we may develop, which could render our product candidates obsolete and noncompetitive.

There are a number of pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of product candidates for the treatment of the most prevalent form of liver cancer, hepatocellular carcinoma, or HCC. Companies working in this area include Alnylam Pharmaceuticals, Inc., Dicerna Pharmaceuticals, Inc., Isis Pharmaceuticals, Inc., Quark Pharmaceuticals, Inc., Regulus Therapeutics, Inc., Rosetta Genomics Ltd., Silence Therapeutics plc and Tekmira Pharmaceuticals Corporation, or Tekmira, as well as a number of the multinational

pharmaceutical companies. Tekmira has announced an ongoing multicenter, single-arm, open-label dose escalation Phase 1/2 study for TKM-PLK1 in HCC. Notably, Bristol Myers Squibb recently presented positive data from an ongoing Phase 1 clinical trial of nivolumab (Opdivo), a PD-1 blocker, demonstrating a 19% response rate. In addition, there are a variety of available therapies marketed for the treatment of liver cancer with which we would expect to compete. Many of the available therapies are well-established and widely accepted by physicians, patients and third-party payors. For example, Nexavar, marketed by Amgen Inc. and Bayer AG, is currently in use for the treatment of HCC. There are also a number of pharmaceuticals and biologics that are marketed or in clinical development for the treatment of solid tumors. The most common treatments for solid tumors are various chemotherapeutic agents, radiation therapy and certain targeted therapies, including monoclonal antibodies such as Avastin®, Erbitux®, Herceptin® and Vectibix®. Small molecules, such as Nexavar, Sutent® and Tarceva®, are also indicated for the treatment of solid tumors.

There are also a number of pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of product candidates for the treatment of various hematological malignancies. Companies working in this area include Celgene Corporation, Gilead Sciences, Inc., Infinity Pharmaceuticals, Inc., Millennium Pharmaceuticals, Inc., Pharmacylics LLC and ProNAi Therapeutics, Inc., as well as a number of the multinational pharmaceutical companies. In addition, there are a variety of available therapies marketed for the treatment of various hematological malignancies with which we would expect to compete. Many of the available therapies are well-established and widely accepted by physicians, patients and third-party payors. For example, Rituxan®, marketed by F. Hoffmann-La Roche Ltd. and Genentech Inc., is currently in use for the treatment of chronic lymphocytic leukemia and non-Hodgkin's lymphoma, or NHL. In addition, ProNAi Therapeutics, Inc. has an ongoing Phase 2 clinical trial in patients with NHL on their lead therapeutic product, PNT2258. There are also a number of pharmaceuticals and biologics that are marketed or in clinical development for the treatment of various hematologic malignancies. The most common treatments for various hematological malignancies are chemotherapeutic agents, radiation therapy and certain targeted therapies, including monoclonal antibodies such as Gazyva®, Arzerra® and Campath®. Small molecules, such as Imbruvica®, Vizada®, Treanda®, Velcade® and Revlimid® are also indicated for the treatment of various hematological malignancies.

In addition to the competition we face from alternative therapies for the diseases we intend to target with our product candidates, we are also aware of several companies that are also working specifically to develop microRNA therapeutics, including miRagen Therapeutics, Inc., Regulus Therapeutics, Inc. and Santaris Pharma A/S (now Roche). Many of our competitors have substantially greater financial, technical and other resources, such as larger research and development staff and experienced marketing and manufacturing organizations. Insurers and other third-party payors may also encourage the use of generic products. For example, if MRX34 is approved, it may be priced at a significant premium over other competitive products. This may make it difficult for MRX34 or any other future products to compete with these products.

If our competitors obtain marketing approval from the FDA or comparable foreign regulatory authorities for their product candidates more rapidly than us, it could result in our competitors establishing a strong market position before we are able to enter the market.

Many of our competitors have materially greater name recognition and financial, manufacturing, marketing, research and drug development resources than we do. Additional mergers and acquisitions in the biotechnology and pharmaceutical industries may result in even more resources being concentrated in our competitors. Large pharmaceutical companies in particular have extensive expertise in preclinical, nonclinical and clinical testing and in obtaining regulatory approvals for drugs. In addition, academic institutions, government agencies, and other public and private organizations conducting research may seek patent protection with respect to potentially competitive products or technologies. These organizations may also establish exclusive collaborative or licensing relationships

with our competitors. Failure of MRX34 or other product candidates to effectively compete against established treatment options or in the future with new products currently in development would harm our business, financial condition, results of operations and prospects.

We may engage in strategic transactions that could impact our liquidity, increase our expenses and present significant distractions to our management.

From time to time, we may consider strategic transactions, such as acquisitions of companies, asset purchases, and out-licensing or in-licensing of products, product candidates or technologies. Additional potential transactions that we may consider include a variety of different business arrangements, including spin-offs, strategic partnerships, joint ventures, restructurings, divestitures, business combinations and investments. Any such transaction may require us to incur non-recurring or other charges, may increase our near- and long-term expenditures and may pose significant integration challenges or disrupt our management or business, which could adversely affect our operations and financial results. For example, these transactions may entail numerous operational and financial risks, including:

- exposure to unknown liabilities;
- disruption of our business and diversion of our management's time and attention in order to develop acquired products, product candidates or technologies;
- incurrence of substantial debt or dilutive issuances of equity securities to pay for acquisitions;
- higher-than-expected acquisition and integration costs;
- write-downs of assets or goodwill or impairment charges;
- increased amortization expenses;
- difficulty and cost in combining the operations and personnel of any acquired businesses with our operations and personnel;
- impairment of relationships with key suppliers or customers of any acquired businesses due to changes in management and ownership; and
- inability to retain key employees of any acquired businesses.

Accordingly, although there can be no assurance that we will undertake or successfully complete any transactions of the nature described above, any transactions that we do complete may be subject to the foregoing or other risks, could have a material adverse effect on our business, financial condition, results of operations and prospects.

We are highly dependent on the services of our President and Chief Executive Officer, Paul Lammers, M.D., M.Sc., and our ability to attract and retain qualified personnel.

We may not be able to attract or retain qualified management and scientific and clinical personnel in the future due to the intense competition for qualified personnel among biotechnology, pharmaceutical and other businesses. Our industry has experienced a high rate of turnover of management and scientific personnel in recent years. If we are not able to attract, retain and motivate necessary personnel to accomplish our business objectives, we may experience constraints that will significantly impede the achievement of our development objectives, our ability to raise additional capital and our ability to implement our business strategy.

We are highly dependent on the principal members of our management and scientific staff. The loss of service of any of our management and key scientific staff could harm our business, particularly our President and Chief Executive Officer, Dr. Lammers. Due to our limited resources, we may not be

able to effectively attract and recruit additional qualified personnel. If we are not able to retain our management, particularly our President and Chief Executive Officer, Dr. Lammers, and to attract, on acceptable terms, additional qualified personnel necessary for the continued development of our business, we may not be able to sustain our operations or grow. Although we have executed employment agreements with each member of our current executive management team, including Dr. Lammers, we may not be able to retain their services as expected.

In addition, we have scientific and clinical advisors who assist us in formulating our product development and clinical strategies. These advisors are not our employees and may have commitments to, or consulting or advisory contracts with, other entities that may limit their availability to us, or may have arrangements with other companies to assist in the development of products that may compete with ours.

Our internal computer systems, or those of our CROs or other contractors or consultants, may fail or suffer security breaches, which could result in a material disruption of our product development programs.

Despite the implementation of security measures, our internal computer systems and those of our CROs and other contractors and consultants are vulnerable to damage from computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. While we have not experienced any such system failure, accident or security breach to date, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our programs. For example, the loss of clinical trial data from completed or ongoing clinical trials for any of our product candidates could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach results in a loss of or damage to our data or applications, or inappropriate disclosure of confidential or proprietary information, including the confidential medical information of clinical trial participants, we could incur liability and the further development of our product candidates could be delayed.

Our employees, independent contractors, principal investigators, CROs, consultants and vendors may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements.

We are exposed to the risk that employees, independent contractors, principal investigators, CROs, consultants and vendors may engage in fraudulent or other illegal activity. Misconduct by these parties could include intentional, reckless and/or negligent conduct or disclosure of unauthorized activities to us that violates: (i) FDA regulations, including those laws requiring the reporting of true, complete and accurate information to the FDA; (ii) manufacturing standards; (iii) federal and state healthcare fraud and abuse laws and regulations; or (iv) laws that require the true, complete and accurate information or data. Specifically, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. Activities subject to these laws also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and serious harm to our reputation. It is not always possible to identify and deter misconduct by our employees and other third parties, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of civil, criminal and administrative penalties, damages, monetary fines, possible exclusion

from participation in Medicare, Medicaid and other federal healthcare programs, contractual damages, reputational harm, diminished profits and future earnings, and curtailment of our operations, any of which could adversely affect our ability to operate our business and our results of operations.

Requirements associated with being a public company will increase our costs significantly, as well as divert significant company resources and management attention.

Prior to this offering, we have not been subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or the other rules and regulations of the Securities and Exchange Commission, or SEC, or any securities exchange relating to public companies. We are working with our legal, independent accounting and financial advisors to identify those areas in which changes should be made to our financial and management control systems to manage our growth and our obligations as a public company. These areas include corporate governance, corporate control, disclosure controls and procedures and financial reporting and accounting systems. We have made, and will continue to make, changes in these and other areas. However, the expenses that will be required in order to adequately prepare for being a public company could be material, particularly after we cease to be an "emerging growth company." Compliance with the various reporting and other requirements applicable to public companies will also require considerable time and attention of management. In addition, the changes we make may not be sufficient to allow us to satisfy our obligations as a public company on a timely basis.

However, for as long as we remain an "emerging growth company" as defined in the Jumpstart our Business Startups Act, or the JOBS Act, we may take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not "emerging growth companies," including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We may take advantage of these reporting exemptions until we are no longer an "emerging growth company." Because the JOBS Act has only recently been enacted, it is not yet clear whether investors will accept the more limited disclosure requirements that we may be entitled to follow while we are an "emerging growth company." If they do not, we may end up electing to comply with disclosure requirements as if we were not an "emerging growth company," in which case we would incur the greater expenses associated with such disclosure requirements.

We will remain an "emerging growth company" for up to five years after the completion of this offering, although if the market value of our common stock that is held by non-affiliates exceeds $700 million as of any June 30 before that time or if we have total annual gross revenues of $1 billion or more during any fiscal year before that time, we would cease to be an "emerging growth company" as of the end of that fiscal year, or if we issue more than $1 billion in non-convertible debt in a three-year period, we would cease to be an "emerging growth company" immediately.

In addition, being a public company could make it more difficult or more costly for us to obtain certain types of insurance, including directors' and officers' liability insurance, and we may be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these events could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors, our board committees or as executive officers.

If we are not able to implement the requirements of Section 404 of the Sarbanes-Oxley Act of 2002 in a timely manner or with adequate compliance, we may be subject to sanctions by regulatory authorities.

Section 404 of the Sarbanes-Oxley Act of 2002 requires that we evaluate and determine the effectiveness of our internal controls over financial reporting and, beginning with our annual report for fiscal year 2016, provide a management report on the internal control over financial reporting. If we have a material weakness in our internal control over financial reporting, we may not detect errors on a timely basis and our financial statements may be materially misstated. We will be evaluating our internal controls systems to allow management to report on, and eventually allow our independent auditors to attest to, our internal controls. We will be performing the system and process evaluation and testing (and any necessary remediation) required to comply with the management certification and eventual auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002. The aforementioned auditor attestation requirements will not apply to us until we are not an "emerging growth company."

To date, we have never conducted a review of our internal controls for the purpose of providing the reports required by these rules. We cannot be certain as to the timing of completion of our evaluation, testing and remediation actions or the impact of the same on our operations. If we are not able to implement the requirements of Section 404 in a timely manner or with adequate compliance, we may be subject to sanctions or investigation by regulatory authorities, such as the SEC or The NASDAQ Stock Market LLC, or NASDAQ. Any such action could adversely affect our financial results or investors' confidence in us and could cause our stock price to fall. Moreover, if we are not able to comply with the requirements of Section 404 in a timely manner, or if we or our independent registered public accounting firm identifies deficiencies in our internal controls that are deemed to be material weaknesses, we could be subject to sanctions or investigations by the SEC, NASDAQ or other regulatory authorities, which would entail expenditure of additional financial and management resources and could materially adversely affect our stock price. Inferior internal controls could also cause us to fail to meet our reporting obligations or cause investors to lose confidence in our reported financial information, which could have a negative effect on our stock price.

Our ability to utilize our net operating loss carryforwards and certain other tax attributes may be limited.

We have incurred substantial losses during our history and do not expect to become profitable in 2015 and may never achieve profitability. To the extent that we continue to generate taxable losses, unused losses will carry forward to offset future taxable income, if any, until such unused losses expire. We may be unable to use these losses to offset income before such unused losses expire. Under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, if a corporation undergoes an "ownership change," generally defined as a greater than 50 percentage point change (by value) in its equity ownership over a three-year period, the corporation's ability to use its pre-change net operating loss, or NOL, carryforwards and other pre-change tax attributes to offset its post-change income or taxes may be further limited. We believe that we have experienced at least one ownership change in the past. We may also experience additional ownership changes as a result of subsequent shifts in our stock ownership, including as a result of this offering. Accordingly, our ability to use our pre-change NOL carryforwards to offset U.S. federal taxable income may be subject to limitations, which could potentially result in increased future tax liability to us. For these reasons, we may not be able to utilize any or a material portion of our NOL carryforwards and other tax attributes.

If we seek and obtain approval to commercialize MRX34 outside of the United States, a variety of risks associated with international operations could materially adversely affect our business.

If MRX34 is approved for commercialization outside the United States, we will likely enter into agreements with third parties to market MRX34 outside the United States. We expect that we will be subject to additional risks related to entering into these international business relationships, including:

- different regulatory requirements for drug approvals in foreign countries;
- differing U.S. and foreign drug import and export rules;
- reduced protection for our intellectual property rights in foreign countries;
- existence of third party intellectual property rights of potential relevance to our business;
- unexpected changes in tariffs, trade barriers and regulatory requirements;
- different reimbursement systems;
- economic weakness, including inflation, or political instability in particular foreign economies and markets;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad or with U.S. regulations that would apply to activities in such foreign jurisdictions, such as the Foreign Corrupt Practices Act;
- foreign taxes, including withholding of payroll taxes;
- foreign currency fluctuations, which could result in increased operating expenses and reduced revenues, and other obligations incident to doing business in another country;
- workforce uncertainty in countries where labor unrest is more common than in the United States;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad;
- potential liability resulting from development work conducted by these distributors; and
- business interruptions resulting from geopolitical actions, including war and terrorism, or natural disasters.

We or the third parties upon whom we depend may be adversely affected by natural disasters and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

Natural disasters could severely disrupt our operations, and have a material adverse effect on our business, financial condition and results of operations. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our headquarters, that damaged critical infrastructure, such as our enterprise financial systems or manufacturing resource planning and enterprise quality systems, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place currently are limited and are unlikely to prove adequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have a material adverse effect on our business.

Furthermore, certain integral parties in our supply chain are geographically concentrated and operating from single sites, increasing their vulnerability to natural disasters or other sudden, unforeseen and severe adverse events. Although we believe there to be sufficient alternative suppliers

in other geographic locations, if such an event were to affect such existing parties in our supply chain, it could have a material adverse effect on our business.

Risks Related to Intellectual Property

If we are unable to obtain and maintain sufficient patent protection for our technology and product candidates, or if the scope of the patent protection is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our product candidates may be adversely affected.

We rely upon a combination of patents, trade secret protection and confidentiality agreements to protect the intellectual property related to our technologies.

In particular, our success depends in large part on our ability to obtain and maintain patent protection in the United States and other countries with respect to our product candidates. If we do not adequately protect our intellectual property, competitors may be able to use our technologies and erode or negate any competitive advantage we may have, which could harm our business and ability to achieve profitability. To protect our proprietary position, we file patent applications in the United States and in limited jurisdictions abroad related to our product candidates and compounds in development that may become our product candidates. The patent application and approval process is expensive and time-consuming. We may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. We may also fail to identify patentable aspects of our research and development before it is too late to obtain patent protection.

The strength of patents in the biotechnology and pharmaceutical field involves complex legal and scientific questions and can be uncertain. This uncertainty includes changes to the patent laws through either legislative action to change statutory patent law or court action that may reinterpret existing law in ways affecting the scope or validity of issued patents. The patent applications that we own or in-license may fail to result in issued patents in the United States or in foreign countries in which we pursue protection with claims that cover our product candidates. There is no assurance that all of the potentially relevant prior art relating to our patents and patent applications has been found, which can invalidate a patent or prevent a patent from issuing from a pending patent application. Even if patents have issued, or do successfully issue, from patent applications that we own or license, third parties may challenge the validity, enforceability or scope thereof, which may result in such patents being narrowed, invalidated or held unenforceable. For example, patents granted by the European Patent Office, or EPO, may be challenged, also known as opposed, by any person within nine months from the publication of their grant. In May 2015, two separate and unidentified parties filed submissions before the EPO opposing a granted European patent related to MRX34, EP2302055 (the '055 Patent), in-licensed to us from Asuragen. We are currently reviewing these submissions and plan to respond to the submissions before the November 2015 EPO response deadline. All of the claims of the '055 Patent remain valid and in force during the opposition proceedings. It is not possible to predict the outcome of the opposition proceedings, for example whether the patent will be maintained, limited in scope or whether the grant may be revoked. If the '055 Patent is ultimately narrowed in scope or revoked during the opposition proceedings, the patent protection afforded by the '055 Patent, and the extent of our exclusivity with respect to commercialization of MRX-34 in Europe could be materially impaired. Even if they are unchallenged, our patents may not adequately protect our product candidates, provide any competitive advantage or prevent others from designing around our claims. If the breadth or strength of protection provided by the patents and patent applications we hold, in-license or pursue with respect to our product candidates is threatened or insufficient, it could dissuade companies from collaborating with us to develop or undermine our ability to commercialize our product candidates and could have a material adverse effect on our business, financial condition, results of operations and prospects.

Currently, our patent portfolio includes over 10 issued U.S. patents and over 42 pending U.S. and ex-U.S. patent applications that we own, co-own, or have in-licensed from third parties, primarily focused on various aspects of microRNA therapeutics, including various microRNA mimics, and methods of use as microRNA related therapies. Within our patent portfolio, we are the sole owner of multiple U.S. and foreign patent applications related to microRNA therapies, including chemically modified versions of miR-34 not currently used in MRX34 (U.S. Patent No. 8,586,727) and other microRNAs mimics that are possible candidates for future product development as microRNA therapeutics. Further, our patent portfolio includes U.S. 7,960,359 and U.S. 8,563,708, both of which are related to miR-34 and are in-licensed from Asuragen. Specifically, U.S. 7,960,359 is related to use of a miR-34a mimic, for example MRX34, for reducing cell viability of human lung cancer cells, human cancerous T cells, human prostate cancer cells or human skin cancer cells. This patent is expected to expire in 2025. See "Business—Intellectual Property—Our Patent Portfolio" for a more detailed description of the patents we own or license covering our product candidates.

If the patent applications we hold or have in-licensed with respect to our programs or product candidates fail to issue, if their breadth or strength of protection is threatened, if we abandon or allow owned or in-licensed patents or patent applications that we are responsible for prosecuting to lapse, or if our owned and in-licensed patents and patent applications fail to provide meaningful exclusivity for our product candidates, it could dissuade companies from collaborating with us to develop product candidates, and threaten our ability to commercialize future products. We have multiple pending patent applications relating to our product candidates. We cannot offer any assurances about which, if any, patents will issue, the breadth of the claims of any such patent, should it issue, or whether any issued patents will be found invalid and/or unenforceable, will be interpreted narrowly or will be threatened by third parties. Any successful opposition to these patents or any other patents owned by or licensed to us could deprive us of rights necessary for the successful commercialization of any product candidates that we may develop.

Almost all of our patents and patent applications are entitled to effective filing dates prior to March 16, 2013. For U.S. patent applications in which patent claims are entitled to a priority date before March 16, 2013, an interference proceeding can be provoked by a third party, for example a competitor, or instituted by the U.S. Patent and Trademark Office, or the USPTO, to determine who was the first to invent any of the subject matter covered by those patent claims. An unfavorable outcome could require us to cease using the related technology or to attempt to license rights from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms. Our participation in an interference proceeding may fail and, even if successful, may result in substantial costs and distract our management.

Further, if we encounter delays in our clinical trials or achieving regulatory approvals, the period of time during which we could market any of our product candidates under patent protection, if approved, would be reduced. Since patent applications in the United States and most other countries are confidential for a period of time after filing, and some remain so until issued, we cannot be certain that we were the first to file any patent application related to our product candidates. Furthermore, an interference proceeding can be provoked by a third party or instituted by the U.S. Patent and Trademark Office, or USPTO, to determine who was the first to invent any of the subject matter covered by the patent claims of our applications. In addition, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after it is filed. Various extensions may be available; however the life of a patent, and the protection it affords, is limited. Even if we obtain patents that cover the manufacture, use and/or sale of our product candidates and such patents are not successfully challenged by any third parties, once the patent life has expired for a product, we may be open to competition, including from generic medications.

We may not be successful in obtaining or maintaining necessary rights to product components and processes for our development pipeline through acquisitions and in-licenses.

Presently we have rights to certain intellectual property through licenses from third parties and under patents that we own or co-own, related to a subset of the known microRNA targets. Because our programs may involve a range of microRNA targets and specific formulations of microRNA mimics directed to such targets, including targets and formulations that may require the use of proprietary rights held by third parties, the growth of our business will likely depend in part on our ability to acquire, in-license or otherwise gain the right to use these proprietary rights. We may be unable to acquire or in-license any necessary or desirable third-party intellectual property rights on reasonable terms, or at all. The licensing and acquisition of third-party intellectual property rights is a competitive area, and a number of more established companies are also pursuing strategies to license or acquire third-party intellectual property rights that we may consider attractive now or in the future. These established companies may have a competitive advantage over us due to their size, cash resources and greater clinical development and commercialization capabilities. In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. We also may be unable to license or acquire third-party intellectual property rights on terms that would allow us to make an appropriate return on our investment. If we are unable to successfully obtain rights to required third-party intellectual property rights, including rights related to our lead product candidate, our business, financial condition and prospects for growth could suffer.

If we are unable to protect the confidentiality of our trade secrets, the value of our technology could be materially adversely affected and our business would be harmed.

In addition to the protection afforded by patents, we rely on trade secret protection and confidentiality agreements to protect proprietary know-how that may not be patentable or that we elect not to patent, processes for which patents may be difficult to obtain or enforce, and any other elements of our product candidates discovery and development processes that involve proprietary know-how, information or technology that is not covered by patents. However, trade secrets can be difficult to protect. We seek to protect our proprietary data and processes, in part, by confidentiality agreements and invention assignment agreements with our employees, consultants, scientific advisors, contractors and collaborators, and any other third parties that have access to our proprietary know-how, information or technology, for example, third parties involved in our clinical trials. Although we expect all of our employees, consultants, advisors and any third parties who have access to our proprietary know-how, information or technology to enter into confidentiality agreements, we cannot provide any assurances that all such agreements have been duly executed, and we cannot be certain that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Misappropriation or unauthorized disclosure of our trade secrets could impair our competitive position and may have a material adverse effect on our business. Additionally, if the steps taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating the trade secret. In addition, others may independently discover our trade secrets and proprietary information. For example, the FDA, as part of its Transparency Initiative, is currently considering whether to make additional information publicly available on a routine basis, including information that we may consider to be trade secrets or other proprietary information, and it is not clear at the present time how the FDA's disclosure policies may change in the future, if at all.

We also seek to preserve the integrity and confidentiality of our data, trade secrets and know-how by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures may be breached, and we may not have adequate remedies for any breach. Moreover, if any of our trade secrets were to be lawfully obtained or independently developed

by a competitor, we would have no right to prevent such competitor from using that technology or information to compete with us, which could harm our competitive position.

Further, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property both in the United States and abroad. If we are unable to prevent material disclosure of the intellectual property related to our technologies to third parties, we will not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, financial condition and results of operations.

Issued patents covering our product candidates could be found invalid or unenforceable if challenged in court or the USPTO.

If we or one of our licensing partners initiated legal proceedings against a third party to enforce a patent covering the manufacture, use or sale, or other aspects of one of our product candidates, the defendant could counterclaim that the patent covering our product candidate is invalid and/or unenforceable. In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace, and there are numerous grounds upon which a third party can assert invalidity or unenforceability of a patent. Third parties may also raise similar claims before administrative bodies in the United States or abroad, even outside the context of litigation. Such mechanisms include ex parte re-examination, inter partes review, post grant review and equivalent proceedings in foreign jurisdictions (e.g., opposition proceedings). Such proceedings could result in revocation or amendment to our patents in such a way that they no longer cover our product candidates. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art, of which we, our patent counsel and the patent examiner were unaware during prosecution. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our product candidates. Similarly, the outcome following administrative review of a patent that we own or license, such as via a reexamination or opposition proceeding before the USPTO or a foreign body, is unpredictable. If a third party were to prevail, we could lose at least part, and perhaps all, of the patent protection on our product candidates. Such a loss of patent protection could have a material adverse impact on our business.

If we are sued for infringing the patent rights or misappropriating the trade secrets of third parties, such litigation could be costly and time consuming and could prevent or delay us from developing or commercializing our product candidates.

Our commercial success depends, in part, on our ability to develop, manufacture, market and sell our product candidates and use our proprietary technology without infringing the patent rights of third parties. Numerous third-party U.S. and non-U.S. issued patents and pending applications exist in the area of microRNA. We are aware of certain U.S. and foreign patents and pending patent applications owned by our competitors or other third parties that cover certain miR-34 mimics and therapeutic uses thereof. We are currently monitoring these patents and patent applications. We have and we may in the future pursue available proceedings in the U.S. and foreign patent offices to challenge the validity of these patents and patent applications. In addition or alternatively, we may consider whether to seek to negotiate a license of rights to technology covered by one or more of such patents and patent applications. If any patents or patent applications cover our product candidates or technologies, we may not be free to manufacture or market our product candidates as planned, absent such a license, which may not be available to us on commercially reasonable terms, or at all. For example, in 2013 we launched opposition proceedings against a granted European patent related to miR-34a. Following oral arguments, the EPO upheld the patent. We are currently evaluating all options as we believe the patent was issued erroneously.

It is also possible that we have failed to identify relevant third-party patents or applications. For example, applications filed before November 29, 2000 and certain applications filed after that date that will not be filed outside the United States remain confidential until patents issue. Moreover, it is difficult for industry participants, including us, to identify all third-party patent rights that may be relevant to our product candidates and technologies because patent searching is imperfect due to differences in terminology among patents, incomplete databases and the difficulty in assessing the meaning of patent claims. We may fail to identify relevant patents or patent applications or may identify pending patent applications of potential interest but incorrectly predict the likelihood that such patent applications may issue with claims of relevance to our technology. In addition, we may be unaware of one or more issued patents that would be infringed by the manufacture, sale or use of a current or future product candidate, or we may incorrectly conclude that a third-party patent is invalid, unenforceable or not infringed by our activities. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our technologies, our products or the use of our products.

There is a substantial amount of intellectual property litigation in the biotechnology and pharmaceutical industries, and we may become party to, or threatened with, litigation or other adversarial proceedings regarding patent rights with respect to our technology or products candidates, including interferences, oppositions and *inter partes* review proceedings before the USPTO and corresponding foreign patent offices. We also monitor patent prosecution activities and pending applications of competitors and potential competitors in our field in order to identify third party patent rights that could pose a potential threat to our freedom to operate in the market with respect to our product candidates, once commercialized. We are currently pursuing and may in the future pursue available administrative proceedings in the U.S. or foreign patent offices to challenge third party patent rights that could adversely impact our ability to commercialize one or more of our product candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our current or future product candidates may be subject to claims of infringement of the patent rights of third parties, who may assert infringement claims against us based on existing or future patent rights. Third parties may assert that we are employing their proprietary technology without authorization. There may be third-party patents or patent applications with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates and third parties could allege that our technology infringes such claims. Further, because patent applications can take many years to issue, third parties may have currently pending patent applications which may later result in issued patents that our product candidates may infringe, or which such third parties claim are infringed by the use of our technologies. The outcome of patent litigation is subject to uncertainties that cannot be adequately quantified in advance. The pharmaceutical and biotechnology industries have produced a significant number of patents, and it may not always be clear to industry participants, including us, which patents cover various types of products or methods of use. The coverage of patents is subject to interpretation by the courts, and the interpretation is not always uniform. If we are sued for patent infringement, we would need to demonstrate that our product candidates, products or methods either do not infringe the patent claims of the relevant patent or that the patent claims are invalid, and we may not be able to do this. Proving that a patent is invalid is difficult. For example, in the United States, proving invalidity requires a showing of clear and convincing evidence to overcome the presumption of validity enjoyed by issued patents. Even if we are successful in these proceedings, we may incur substantial costs and the time and attention of our management and scientific personnel could be diverted in pursuing these proceedings, which could have a material adverse effect on us. In addition, we may not have sufficient resources to bring these actions to a successful conclusion.

If we are found to infringe a third party's patent rights, we could be forced, including by court order, to cease developing, manufacturing or commercializing the infringing product candidate or product. Alternatively, we may be required to obtain a license from such third party in order to use the

infringing technology and continue developing, manufacturing or marketing the infringing product candidate. However, we may not be able to obtain any required license on commercially reasonable terms or at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. In addition, we could be found liable for monetary damages, including treble damages and attorneys' fees if we are found to have willfully infringed a patent. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, which could materially harm our business. Claims that we have misappropriated the confidential information or trade secrets of third parties could have a similar negative impact on our business.

Parties making claims against us for infringement of their patent rights may obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize one or more of our product candidates. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful claim of infringement against us, we could be required to redesign our infringing products or obtain a license from such third party to continue developing and commercializing our products and technology. However, we may not be able to obtain any required license on commercially reasonable terms, or at all. Even if we are able to obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. It may be impossible to redesign our products and technology, or it may require substantial time and monetary expenditure, which could force us to cease commercialization of one or more of our product candidates, or some of our business operations, which could materially harm our business. In addition, in any such proceeding, we may be required to pay substantial damages, including treble damages and attorneys' fees in the event we are found liable for willful infringement.

We may be involved in lawsuits or administrative proceedings to protect or enforce our intellectual property rights, which could be expensive, time consuming and unsuccessful.

Competitors may infringe or we may believe that they infringe patents that we own or license. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours is not valid or is unenforceable, or may refuse to stop the other party in such infringement proceeding from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation or defense proceedings could put one or more of our patents at risk of being invalidated, held unenforceable or interpreted narrowly, and could put any of our patent applications at risk of not yielding an issued patent. Litigation is uncertain, and we cannot predict whether we would be successful in any such litigation.

Interference proceedings provoked by third parties or brought by the USPTO or any foreign patent authority may be necessary to determine the priority of inventions with respect to our patents or patent applications. An unfavorable outcome could require us to cease using the related technology or to attempt to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms, if any license is offered at all. Litigation or interference proceedings may fail and, even if successful, may result in substantial costs and distract our management and other employees.

We may not be able to prevent misappropriation of our trade secrets or confidential information, particularly in countries where the laws may not protect those rights as fully as in the United States. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors

perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock.

Legal actions to enforce patent rights or other intellectual property rights that we own or license can be expensive and may involve the diversion of significant management time. In addition, these legal actions could be unsuccessful and could also result in the invalidation of our patents or a finding that they are unenforceable. Moreover, third parties may be able to successfully design around our patents using pre-existing technology, by developing new technology or by using similar technology that is outside the scope of our patents. We may or may not choose to pursue litigation against those that have infringed on our patents, or used them without authorization, due to the associated expense and time commitment of monitoring these activities. If we fail to protect or to enforce our intellectual property rights successfully, our competitive position could suffer, which could harm our results of operations.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on all of our product candidates throughout the world would be prohibitively expensive, and our patent rights in some countries outside the United States can be less extensive than those in the United States. The requirements for patentability may differ in certain countries, particularly developing countries. For example, unlike other countries, China has a heightened requirement for patentability, and specifically requires a detailed description of medical uses of a claimed therapeutic. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions.

As part of ordinary course prosecution and maintenance activities, we determine whether to seek patent protection outside the United States and in which countries. This also applies to patents we have acquired or in-licensed from third parties. In some cases this means that we, or our predecessors in interest or licensors of patents within our portfolio, have sought patent protection in a limited number of countries for patents covering our product candidates, including for patents providing coverage for MRX34. Competitors may use our technologies in jurisdictions where we have not pursued and obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we have patent protection but where enforcement is not as strong as in the United States. These products may compete with our products in jurisdictions where we do not have any issued patents and, even in jurisdictions where we have or are able to obtain issued patents, our patent claims or other intellectual property rights may not be effective or sufficient to prevent them from so competing. Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, particularly those relating to biopharmaceuticals, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. In addition, certain countries in Europe and certain developing countries, including India and China, have compulsory licensing laws under which a patent owner may be compelled to grant licenses to third parties. In those countries, we may have limited remedies if our patents are infringed or if we are compelled to grant a license to our patents to a third party, which

could materially diminish the value of those patents. This could limit our potential revenue opportunities.

Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we own or license. Moreover, patent protection must ultimately be sought on a country-by-country basis, which is an expensive and time-consuming process with uncertain outcomes. Accordingly, we may choose not to seek patent protection in certain countries, and we will not have the benefit of patent protection in such countries.

The patent protection and patent prosecution for some of our product candidates may be dependent on our third party licensors.

While we normally seek to obtain the right to control the filing, prosecution, maintenance, defense and enforcement of the patents and patent applications that we in-license relating to our product candidates, there may be times when such activities for patents that relate to our product candidates are controlled by our licensors. For example, we do not have the first right to prosecute, maintain, defend, or enforce the patent rights licensed to us relating to the SMARTICLES technology under our agreement with Marina Biotech, Inc., or Marina. Although we may retain the right to consult on such filing, prosecution, maintenance, defense, and enforcement activities, our overall ability to influence such activities is limited. Moreover, the patent rights we have in-licensed from Marina may be put at risk in litigation or administrative proceedings unrelated to our product candidates. Further, while we seek to have rights to take action to defend our in-licensed patents and patent applications from third-party challenges in the event that our licensors determine not to, we may not be aware of any such potential threats to the intellectual property rights we in-license, or we may be unsuccessful in protecting such intellectual property rights if we respond to any such challenges by third parties.

If these licensors or any of our future licensors fail to appropriately file, prosecute, maintain, defend or enforce our in-licensed patents and patent applications covering any of our product candidates, our ability to develop and commercialize those product candidates may be adversely affected and we may not be able to prevent competitors from making, using and selling competing products.

If we breach any of the agreements under which we license patent rights to use, develop and commercialize our product candidates or our technologies from third parties or, in certain cases, we fail to meet certain development deadlines, we could lose license rights that are important to our business.

We are a party to a number of license agreements under which we are granted rights to intellectual property that are important to our business and we expect that we may need to enter into additional license agreements in the future. These include our exclusive cross-license agreement with Asuragen, our exclusive licenses from Yale University, or Yale, Marina and the University of Zurich.

Our existing license agreements, except our cross-license agreement with Asuragen, generally impose, and we expect that future license agreements will impose on us, various development, regulatory and/or commercial diligence obligations, and financial obligations, such as payment of milestones and/or royalties. If we fail to comply with our obligations under these agreements, or we are subject to a bankruptcy, the licensor may have the right to terminate the license, in which event we may not be able to market products covered by the license. Our business could suffer, for example, if any current or future licenses terminate, if the licensors fail to abide by the terms of the license, if the licensed patents or other rights are found to be invalid or unenforceable, or if we are unable to enter into necessary licenses on acceptable terms. See "Business—Strategic Partnerships and Collaborations" for a description of our license agreements, which sets forth the material terms and obligations,

including a description of the termination provisions, under our agreements with Asuragen, Yale, Marina and the University of Zurich.

We license the technology related to SMARTICLES from Marina. Our license with Marina imposes various development, regulatory, commercial diligence, financial and other obligations. If we fail to comply with our obligations under the agreement with Marina, or otherwise materially breach the agreement with Marina, and fail to remedy such failure or cure such breach, Marina may have the right to terminate the license. The loss of the license from Marina would affect a portion of the patent portfolio for MRX34, which would adversely affect our ability to proceed with any development or potential commercialization of MRX34, and could subject us to claims of patent infringement by Marina if MRX34 is covered by the affected patents.

As we have done previously, we may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates, and we cannot provide any assurances that third-party patents do not exist that might be enforced against our current product candidates or future products in the absence of such a license. We may fail to obtain any of these licenses on commercially reasonable terms, if at all. Even if we are able to obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. In that event, we may be required to expend significant time and resources to develop or license replacement technology. If we are unable to do so, we may be unable to develop or commercialize the affected product candidates, which could materially harm our business and the third parties owning such intellectual property rights could seek either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation.

Licensing of intellectual property is of critical importance to our business and involves complex legal, business and scientific issues. Disputes may arise between us and our licensors regarding intellectual property subject to a license agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- whether and the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- our right to sublicense patent and other rights to third parties under collaborative development relationships;
- our diligence obligations with respect to the use of the licensed technology in relation to our development and commercialization of our product candidates, and what activities satisfy those diligence obligations; and
- the ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our partners.

If disputes over intellectual property that we have licensed arise, we would expect to exercise all rights and remedies available to us, including seeking to cure any breach by us, and otherwise seek to preserve our rights under the patents licensed to us. However, we may not be able to do so in a timely manner, at an acceptable cost or at all. Generally, the loss of any one of our current licenses, or any other license we may acquire in the future, could prevent or impair our ability to successfully develop and commercialize the affected product candidates and thus materially harm our business, prospects, financial condition and results of operations.

Intellectual property rights do not necessarily address all potential threats to our competitive advantage.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and may not adequately protect our business, provide a barrier to entry against our competitors or potential competitors, or permit us to maintain our competitive advantage. Moreover, if a third party has intellectual property rights that cover the practice of our technology, we may not be able to fully exercise or extract value from our intellectual property rights. The following examples are illustrative:

- others may be able to make compounds that are similar to our product candidates but that are not covered by the claims of the patents that we own or license;
- we or our licensors or collaborators might not have been the first to make the inventions covered by an issued patent or pending patent application that we own or license;
- we or our licensors or collaborators might not have been the first to file patent applications covering an invention;
- others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing or misappropriating our intellectual property rights;
- pending patent applications that we own or license may not lead to issued patents;
- issued patents that we own or license may not provide us with any competitive advantages, or may be held invalid or unenforceable, as a result of legal challenges by our competitors;
- our competitors might conduct research and development activities in countries where we do not have patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- we may not develop or in-license additional proprietary technologies that are patentable; and
- the patents of others may have an adverse effect on our business.

Should any of these events occur, they could significantly harm our business, results of operations and prospects.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We were previously involved in discussions with Yale regarding the inventorship and ownership of certain patents and patent applications licensed to us by Asuragen. An independent third party expert was engaged to determine the inventorship and the ownership of patents and patent applications potentially subject to Yale and Asuragen co-ownership. This determination confirmed Asuragen's sole ownership of the patents and patent applications where co-ownership had been under consideration and resulted in a determination that Yale should be removed as a co-owner of one of the pending patent applications, an action we are currently undertaking.

Although we seek to protect our ownership of our patents and other intellectual property by ensuring that our agreements with our employees and certain collaborators and other third parties with whom we do business include provisions requiring, for instance, such parties to assign rights in inventions to us, we may be subject to claims that former or current employees, collaborators or other third parties have an ownership interest in our patents, in-licensed patents or other intellectual property. In some situations, our confidentiality agreements may conflict with, or be subject to, the rights of third parties with whom our employees, consultants or advisors have previous employment or consulting relationships, and further, many of our consultants are currently retained by other biotechnology or pharmaceutical companies, including our competitors or potential competitors, and

may be subject to conflicting obligations to these third parties. To the extent that our employees, consultants or contractors use any intellectual property owned by third parties in their work for us, disputes may arise as to the ownership of rights in any related or resulting know-how and inventions, arising, for example, from such conflicting obligations of consultants, employees or others who are involved in developing our product candidates. Litigation may be necessary to defend against these and other claims challenging inventorship or ownership. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, valuable intellectual property. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees.

Obtaining and maintaining patent protection depends on compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent prosecution process. Periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and/or patent applications will be due to be paid to the USPTO and various patent agencies outside of the United States in several stages over the lifetime of the patents and/or applications. We have systems in place to remind us to pay these fees, and we employ reputable law firms and other professionals and rely on such third parties to effect payment of these fees with respect to the USPTO and non-U.S. patent agencies with respect to the patents and patent applications we own, and we rely upon our licensors to effect payment of these fees with respect to the patents and patent applications that we in-license. Even if we do not control prosecution and maintenance of our in-licensed patents, we may be responsible for reimbursing our licensors for some or all of the costs associated with such activities. If we fail to make timely payment to our licensors for such fees, our licensors may have the right to terminate the affected license, in which event we would not be able to market products covered by the license. We also employ reputable law firms and other professionals to help us comply with the various documentary and other procedural requirements with respect to the patents and patent applications that we own. In some cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. However, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors might be able to enter the market and this circumstance would have a material adverse effect on our business.

Changes in U.S. patent law could diminish the value of patents in general, thereby impairing our ability to protect our products, and recent patent reform legislation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents.

As is the case with other biotechnology companies, our success is heavily dependent on patents. Obtaining and enforcing patents in the biotechnology industry involve both technological and legal complexity, and is therefore costly, time-consuming and inherently uncertain. In addition, the United States has recently enacted and is currently implementing wide-ranging patent reform legislation. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the U.S. Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. Some of our patent claims may be

affected by the recent U.S. Supreme Court decision in *Association for Molecular Pathology v. Myriad Genetics*. In *Myriad*, the Supreme Court held that unmodified isolated fragments of genomic sequences, such as the DNA constituting the BRCA1 and BRCA2 genes, are not eligible for patent protection because they constitute a product of nature. The exact boundaries of the Supreme Court's decision remain unclear as the Supreme Court did not address other types of nucleic acids, such as isolated microRNAs. Nevertheless, our patent portfolio contains claims of various types and scope, including chemically modified mimics, such as in MRX34, as well as methods of medical treatment. In our view, the presence of varying claims in our patent portfolio significantly reduces, but does not eliminate, our exposure to potential validity challenges under *Myriad* or future judicial decisions. However, it is not yet clear what, if any, impact this recent Supreme Court decision or future decisions will have on the operation of our business.

For our U.S. patent applications containing a claim not entitled to priority before March 16, 2013, there is a greater level of uncertainty in the patent law. On September 16, 2011, the Leahy-Smith America Invents Act, or the Leahy-Smith Act, was signed into law. The Leahy-Smith Act includes a number of significant changes to U.S. patent law. These include provisions that affect the way patent applications will be prosecuted and may also affect patent litigation. The USPTO has promulgated regulations and developed procedures to govern administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act, and in particular, the first to file provisions, did not come into effect until March 16, 2013. Accordingly, it is not yet clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. However, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business and financial condition.

An important change introduced by the Leahy-Smith Act is that, as of March 16, 2013, the United States transitioned to a "first-to-file" system for deciding which party should be granted a patent when two or more patent applications are filed by different parties claiming the same invention. A third party that files a patent application in the USPTO after that date but before us could therefore be awarded a patent covering an invention of ours even if we had made the invention before it was made by the third party. This will require us to be cognizant going forward of the time from invention to filing of a patent application. Furthermore, our ability to obtain and maintain valid and enforceable patents depends on whether the differences between our technology and the prior art allow our technology to be patentable over the prior art. Since patent applications in the United States and most other countries are confidential for a period of time after filing, we cannot be certain that we were the first to either (i) file any patent application related to our product candidates or (ii) invent any of the inventions claimed in our patents or patent applications.

Among some of the other changes introduced by the Leahy-Smith Act are changes that limit where a patentee may file a patent infringement suit and providing opportunities for third parties to challenge any issued patent in the USPTO. This applies to all of our U.S. patents, even those issued before March 16, 2013. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in United States federal court necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action.

We may be subject to claims that our employees or consultants or independent contractors have wrongfully used or disclosed confidential information or trade secrets of third parties or that our employees or consultants have wrongfully used or disclosed alleged trade secrets of former or other employers.

Many of our employees, independent contractors and consultants, including our senior management, have been previously employed or retained by other biotechnology or pharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants and independent contractors do not use the proprietary information or know-how of third parties in their work for us, and do not perform work for us that is in conflict with their obligations to another employer or any other entity, we may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise improperly used or disclosed confidential information, including trade secrets or other proprietary information, of a former employer or other third parties. We may also be subject to claims that an employee, advisor, consultant, or independent contractor performed work for us that conflicts with that person's obligations to a third party, such as an employer, and thus, that the third party has an ownership interest in the intellectual property arising out of work performed for us. We are not aware of any threatened or pending claims related to these matters, but in the future litigation may be necessary to defend against such claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable personnel or intellectual property rights, such as exclusive ownership of, or right to use, valuable intellectual property. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management.

Intellectual property disputes could cause us to spend substantial resources and distract our personnel from their normal responsibilities.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims may cause us to incur significant expenses, and could distract our technical and/or management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the market price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our ability to compete in the marketplace.

If we do not obtain patent term extension in the United States under the Hatch-Waxman Act and in foreign countries under similar legislation, thereby potentially extending the term of our marketing exclusivity for our product candidates, our business may be materially harmed.

Depending upon the timing, duration and specifics of FDA marketing approval of our product candidates, if any, one of the U.S. patents covering each of such approved product(s) or the use thereof may be eligible for up to five years of patent term restoration under the Hatch-Waxman Act. The Hatch-Waxman Act allows a maximum of one patent to be extended per FDA approved product. Patent term extension also may be available in certain foreign countries upon regulatory approval of our product candidates. Nevertheless, we may not be granted patent term extension either in the United States or in any foreign country because of, for example, failing to apply within applicable deadlines, failing to apply prior to expiration of relevant patents or otherwise failing to satisfy applicable requirements. Moreover, the term of extension, as well as the scope of patent protection

during any such extension, afforded by the governmental authority could be less than we request. In addition, if a patent we wish to extend is owned by another party and licensed to us, we may need to obtain approval and cooperation from our licensor to request the extension.

If we are unable to obtain patent term extension or restoration, or the term of any such extension is less than we request, the period during which we will have the right to exclusively market our product will be shortened and our competitors may obtain approval of competing products following our patent expiration, and our revenue could be reduced, possibly materially.

Risks Related to Government Regulation

Even if we receive regulatory approval for a product candidate, we will be subject to ongoing regulatory obligations and continued regulatory review, which may result in significant additional expense and subject us to penalties if we fail to comply with applicable regulatory requirements.

Once regulatory approval has been granted, the approved product and its manufacturer are subject to continual review by the FDA and/or non-U.S. regulatory authorities. Any regulatory approval that we receive for our product candidates may be subject to limitations on the indicated uses for which the product may be marketed or contain requirements for potentially costly post- marketing follow-up studies to monitor the safety and efficacy of the product. In addition, if the FDA and/or non-U.S. regulatory authorities approve any of our product candidates, we will be subject to extensive and ongoing regulatory requirements by the FDA and other regulatory authorities with regard to the labeling, packaging, adverse event reporting, storage, sampling, advertising, promotion and recordkeeping for our products. Manufacturers of our products are required to comply with cGMP regulations, which include requirements related to quality control and quality assurance as well as the corresponding maintenance of records and documentation. Further, regulatory authorities must approve these manufacturing facilities before they can be used to manufacture our products, and these facilities are subject to continual review and periodic inspections by the FDA and other regulatory authorities for compliance with cGMP regulations. Accordingly, we and others with whom we work must continue to expend time, money, and effort in all areas of regulatory compliance, including manufacturing, production, and quality control. We will also be required to report certain adverse reactions and production problems, if any, to the FDA, and to comply with requirements concerning advertising and promotion for our products. Promotional communications with respect to prescription drugs are subject to a variety of legal and regulatory restrictions and must be consistent with the information in the product's approved label. As such, we may not promote our products for indications or uses for which they do not have FDA approval.

If we, any current or future collaborator or a regulatory authority discovers previously unknown problems with a product, such as adverse events of unanticipated severity or frequency, or problems with the facility where the product is manufactured, a regulatory authority may impose restrictions on that product, such collaborator, the manufacturer or us, including requiring withdrawal of the product from the market or suspension of manufacturing. If we, our product candidates or the manufacturing facilities for our product candidates fail to comply with regulatory requirements of the FDA and/or other non-U.S. regulatory authorities, we could be subject to administrative or judicially imposed sanctions, including:

- warning letters;
- civil or criminal penalties;
- injunctions;
- suspension of or withdrawal of regulatory approval;
- total or partial suspension of any ongoing clinical trials or of production;

- voluntary or mandatory product recalls and publicity requirements;
- refusal to approve pending applications for marketing approval of new products or supplements to approved applications filed by us;
- restrictions on operations, including costly new manufacturing requirements; or
- seizure or detention of our products or import bans.

The regulatory requirements and policies may change and additional government regulations may be enacted for which we may also be required to comply. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action, either in the United States or in other countries. Any new regulations or revisions or reinterpretations of existing regulations may impose additional costs or lengthen review times of our product candidates. In addition, if we or any current or future collaborator are not able to maintain regulatory compliance, we or such collaborator, as applicable, will not be permitted to market our future products and our business will suffer.

The availability of adequate third-party coverage and reimbursement for newly approved products is uncertain, and failure to obtain adequate coverage and reimbursement from third-party payors could impede our ability to market any future products we may develop and could limit our ability to generate revenue.

There is significant uncertainty related to the third-party payor coverage and reimbursement of newly approved medical products. The commercial success of our future products in both domestic and international markets depends on whether such third-party coverage and reimbursement are available for our future products. Governmental payors, including Medicare and Medicaid, health maintenance organizations and other third-party payors are increasingly attempting to manage their healthcare expenditures and challenging the prices charged for medical products and services by limiting both coverage and the level of reimbursement of new drugs and biologics and, as a result, they may not cover or provide adequate reimbursement for our future products. These payors may not view our future products as cost-effective, and coverage and reimbursement may not be available to our customers, may be limited to certain indications or may not be sufficient to allow our future products to be marketed on a competitive basis. Third-party payors are exerting increasing influence on decisions regarding the use of, and coverage and reimbursement levels for, particular treatments. Cost-control initiatives could cause us to decrease the price we might establish for our products candidates, which could result in lower than anticipated product revenues. If we decrease the prices for our product candidates because of competitive pressures or if governmental and other third-party payors do not provide adequate coverage or reimbursement, our prospects for revenue and profitability will suffer.

If we fail to comply or are found to have failed to comply with FDA and other regulations related to the promotion of our products for unapproved uses, we could be subject to criminal penalties, substantial fines or other sanctions and damage awards.

The regulations relating to the promotion of products for unapproved uses are complex and subject to substantial interpretation by the FDA and other government agencies. If we receive marketing approval for MRX34 or other product candidates, we will be restricted from promoting the products for uses outside of the approved labeling. However, physicians may nevertheless prescribe products to their patients in a manner that is inconsistent with the approved label. We intend to implement compliance and training programs designed to ensure that our sales and marketing practices comply with applicable regulations. Notwithstanding these programs, the FDA or other government agencies may allege or find that our practices constitute prohibited promotion of our products for unapproved uses. We also cannot be sure that our employees will comply with company policies and applicable regulations regarding the promotion of products for unapproved uses.

Over the past several years, a significant number of pharmaceutical and biotechnology companies have been the target of inquiries and investigations by various federal and state regulatory, investigative, prosecutorial and administrative entities in connection with the promotion of products for unapproved uses and other sales practices, including the Department of Justice and various U.S. Attorneys' Offices, the Office of Inspector General of the Department of Health and Human Services, the FDA, the Federal Trade Commission and various state Attorneys General offices. These investigations have included claims asserting alleged violations of various federal and state laws and regulations, including antitrust laws, the Food, Drug and Cosmetic Act, the False Claims Act, the Prescription Drug Marketing Act, anti-kickback laws, and other alleged violations in connection with the promotion of products for unapproved uses, pricing and reimbursement from government programs such as the Medicare and Medicaid programs. Many of these investigations originate as "qui tam" actions, commonly referred to as "whistleblower suits," under the False Claims Act, often brought by current or former employees. Under the False Claims Act, any individual can bring a claim on behalf of the government alleging that a person or entity has presented a false claim, or caused a false claim to be submitted, to the government for payment. In a qui tam suit, the government must decide whether to intervene and prosecute the case. If it declines, the individual may pursue the case alone. The person bringing a qui tam suit is entitled to a share of any recovery or settlement, up to a certain cap; the relator's share depends on the extent of the relator's involvement in the case and whether the government intervenes.

If the FDA or any other governmental agency initiates an enforcement action against us or if we are the subject of a qui tam suit and it is determined that we violated prohibitions relating to the promotion of products for unapproved uses, we could be subject to substantial civil or criminal fines or damage awards and other sanctions such as consent decrees and corporate integrity agreements pursuant to which our activities would be subject to ongoing scrutiny and monitoring to ensure compliance with applicable laws and regulations. Any such fines, awards or other sanctions would have an adverse effect on our revenue, business, financial prospects and reputation.

If approved, MRX34 or any future products may cause or contribute to adverse medical events that we are required to report to regulatory agencies, and if we fail to do so we could be subject to sanctions that would materially harm our business.

If we are successful in commercializing MRX34 or any other products, FDA and foreign regulatory agency regulations require that we report certain information about adverse medical events if those products may have caused or contributed to those adverse events. The timing of our obligation to report would be triggered by the date we become aware of the adverse event as well as the nature of the event. We may fail to report adverse events we become aware of within the prescribed timeframe. We may also fail to appreciate that we have become aware of a reportable adverse event, especially if it is not reported to us as an adverse event or if it is an adverse event that is unexpected or removed in time from the use of our products. If we fail to comply with our reporting obligations, the FDA or a foreign regulatory agency could take action, including criminal prosecution, the imposition of civil monetary penalties, seizure of our products or delay in approval of future products. Through the first 28 months of our Phase 1 clinical trial, most of the 101 patients treated with MRX34 experienced at least one adverse event, with fever, chills, back pain, abdominal pain, nausea, diarrhea, vomiting, dehydration, anorexia, dyspnea, fatigue, headache, cough, insomnia, dysgeusia, tachycardia, anemia, neutropenia, lymphopenia, leukopenia, thrombocytopenia, elevation of liver enzymes, hyperglycemia, and hyponatremia being the most commonly reported adverse events. One treatment related death occurred during the study. Among the 47 patients in the BIW dosing cohorts, the serious adverse events determined to be related to MRX34 treatment occurring in more than one patient were fever, fatigue, dehydration and elevation of liver enzymes, each of which occurred in two patients. For the 54 patients in the QD × 5 schedule, the serious adverse events determined to be related to MRX34 treatment occurring in more than one patient were fever, bleeding in silent or asymptomatic brain

metastasis and elevation of liver enzymes in two patients each, and thrombocytopenia, which occurred in three patients. These adverse events associated with MRX34 are generally manageable or preventable with standard interventions or tests used by oncologists, such as administering other medications that prevent or reduce side effects, temporary slowing of infusions, delaying or stopping dosing, or using magnetic resonance imaging, or MRI, to detect silent brain metastases. Of the 32 patients with primary liver cancer treated with escalating doses of MRX34, one patient receiving a 70 mg/m^2 dose in BIW schedule achieved confirmed partial response. This patient is one of the 12 patients with primary liver cancer enrolled from the Korean sites. Of the two melanoma patients enrolled in the study as of August 13, 2015, one patient enrolled in the 110 mg/m^2 dose cohort on the QD × 5 schedule achieved a confirmed partial response after four cycles of MRX34 treatment. See "Business—MRX34: Our Lead Product Candidate" for a more detailed description of the adverse events experienced during the course of the MRX34 clinical development program.

Failure to obtain regulatory approvals in foreign jurisdictions will prevent us from marketing our product candidates internationally.

We may seek a distribution and marketing collaborator for MRX34 or other product candidates. In order to market our product candidates in the European Economic Area, or EEA (which is comprised of the 28 Member States of the EU plus Norway, Iceland and Liechtenstein), and many other foreign jurisdictions, we or any such collaborator must obtain separate regulatory approvals. More concretely, in the EEA, medicinal products can only be commercialized after obtaining a Marketing Authorization, or MA. There are two types of marketing authorizations:

- The Community MA, which is issued by the European Commission through the Centralized Procedure, based on the opinion of the Committee for Medicinal Products for Human Use of the European Medicines Agency, or EMA, and which is valid throughout the entire territory of the EEA. The Centralized Procedure is mandatory for certain types of products, such as biotechnology medicinal products, orphan medicinal products, and medicinal products indicated for the treatment of AIDS, cancer, neurodegenerative disorders, diabetes, auto-immune and viral diseases. The Centralized Procedure is optional for products containing a new active substance not yet authorized in the EEA, or for products that constitute a significant therapeutic, scientific or technical innovation or which are in the interest of public health in the EU.

- National MAs, which are issued by the competent authorities of the Member States of the EEA and only cover their respective territory, are available for products not falling within the mandatory scope of the Centralized Procedure. Where a product has already been authorized for marketing in a Member State of the EEA, this National MA can be recognized in another Member State through the Mutual Recognition Procedure. If the product has not received a National MA in any Member State at the time of application, it can be approved simultaneously in various Member States through the Decentralized Procedure.

Under these two procedures, before granting the MA, the EMA or the competent authorities of the Member States of the EEA make an assessment of the risk-benefit balance of the product on the basis of scientific criteria concerning its quality, safety and efficacy.

We have had limited interactions with foreign regulatory authorities, and the approval procedures vary among countries and can involve additional clinical testing, and the time required to obtain approval may differ from that required to obtain FDA approval. Clinical trials conducted in one country may not be accepted by regulatory authorities in other countries. Approval by the FDA does not ensure approval by regulatory authorities in other countries, and approval by one or more foreign regulatory authorities does not ensure approval by regulatory authorities in other foreign countries or by the FDA. However, a failure or delay in obtaining regulatory approval in one country may have a negative effect on the regulatory process in others. The foreign regulatory approval process may include

all of the risks associated with obtaining FDA approval. We or may not obtain foreign regulatory approvals on a timely basis, if at all. We may not be able to file for regulatory approvals and even if we file, we may not receive necessary approvals to commercialize our product candidates in any market.

Healthcare reform measures could hinder or prevent our product candidates' commercial success.

In the United States, there have been, and we expect there will continue to be, a number of legislative and regulatory changes to the healthcare system that could affect our future revenues and profitability and the future revenues and profitability of our potential customers. Federal and state lawmakers regularly propose and, at times, enact legislation that results in significant changes to the healthcare system, some of which are intended to contain or reduce the costs of medical products and services. For example, in March 2010, the President signed one of the most significant healthcare reform measures in decades, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively, the Affordable Care Act. It contains a number of provisions, including those governing enrollment in federal healthcare programs, reimbursement changes and fraud and abuse measures, all of which will impact existing government healthcare programs and will result in the development of new programs. The Affordable Care Act, among other things:

- imposes a non-deductible annual fee on pharmaceutical manufacturers or importers who sell "branded prescription drugs";
- increases the minimum level of Medicaid rebates payable by manufacturers of brand-name drugs from 15.1% to 23.1%;
- addresses a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected;
- requires collection of rebates for drugs paid by Medicaid managed care organizations;
- requires manufacturers to participate in a coverage gap discount program, under which they must agree to offer 50% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D; and
- mandates a further shift in the burden of Medicaid payments to the states.

Other legislative changes have been proposed and adopted since the Affordable Care Act was enacted. On August 2, 2011, the President signed into law the Budget Control Act of 2011, which, among other things, created the Joint Select Committee on Deficit Reduction to recommend proposals in spending reductions to Congress. The Joint Select Committee did not achieve its targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, triggering the legislation's automatic reductions to several government programs. These reductions include aggregate reductions to Medicare payments to providers of 2% per fiscal year, which went into effect on April 1, 2013 and, due to subsequent legislative amendments, will remain in effect through 2024 unless additional Congressional action is taken. On January 2, 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, among other things, further reduced Medicare payments to several providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

There likely will continue to be legislative and regulatory proposals at the federal and state levels directed at containing or lowering the cost of health care. We cannot predict the initiatives that may be adopted in the future or their full impact. The continuing efforts of the government, insurance companies, managed care organizations and other payors of healthcare services to contain or reduce costs of health care may adversely affect:

- our ability to set a price we believe is fair for our products;
- our ability to generate revenues and achieve or maintain profitability; and
- the availability of capital.

In light of widely publicized events concerning the safety risk of certain drug products, regulatory authorities, members of Congress, the Governmental Accounting Office, medical professionals and the general public have raised concerns about potential drug safety issues. These events have resulted in the withdrawal of drug products, revisions to drug labeling that further limit use of the drug products and establishment of risk management programs that may, for instance, restrict distribution of drug products. The increased attention to drug safety issues may result in a more cautious approach by the FDA to clinical trials and the drug approval process. Data from clinical trials may receive greater scrutiny with respect to safety, which may make the FDA or other regulatory authorities more likely to terminate clinical trials before completion, or require longer or additional clinical trials that may result in substantial additional expense and a delay or failure in obtaining approval or approval for a more limited indication than originally sought. In, addition, because of the serious public health risks of high profile adverse safety events with certain products, the FDA may require, as a condition of approval, costly risk management programs which may include safety surveillance, restricted distribution and use, patient education, enhanced labeling, special packaging or labeling, expedited reporting of certain adverse events, preapproval of promotional materials and restrictions on direct-to-consumer advertising.

If we fail to comply with healthcare regulations, we could face substantial penalties and our business, results of operations and financial condition could be adversely affected.

Even though we do not and will not control referrals of healthcare services or bill directly to Medicare, Medicaid or other third-party payors, certain federal and state healthcare laws and regulations pertaining to fraud and abuse and patients' rights are and will be applicable to our business. We could be subject to healthcare fraud and abuse and patient privacy regulation by both the federal government and the states in which we conduct our business. The regulations that may affect our ability to operate include, without limitation:

- the federal Anti-Kickback Statute, which prohibits, among other things, any person from knowingly and willfully offering, soliciting, receiving or providing remuneration, directly or indirectly, to induce either the referral of an individual, for an item or service or the purchasing or ordering of a good or service, for which payment may be made under federal healthcare programs such as the Medicare and Medicaid programs. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it to have committed a violation. In addition, the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act;
- the federal False Claims Act, which prohibits, among other things, individuals or entities from knowingly presenting, or causing to be presented, false claims, or knowingly using false statements, to obtain payment from the federal government, and which may apply to entities that provide coding and billing advice to customers;
- federal criminal laws that prohibit executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters. Similar to the federal Anti-Kickback

Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it to have committed a violation;

- the federal Physician Payment Sunshine Act, which requires manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report annually to the government information related to payments or other "transfers of value" made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, and requires applicable manufacturers and group purchasing organizations to report annually to the government ownership and investment interests held by the physicians described above and their immediate family members and payments or other "transfers of value" to such physician owners (manufacturers are required to submit reports to the government by the 90th day of each calendar year);

- the federal Health Insurance Portability and Accountability Act of 1996, as amended by the Health Information Technology for Economic and Clinical Health Act, which governs the conduct of certain electronic healthcare transactions and protects the security and privacy of protected health information; and

- state law equivalents of each of the above federal laws, such as anti-kickback and false claims laws which may apply to items or services reimbursed by any third-party payor, including commercial insurers; state laws that require pharmaceutical companies to comply with the industry's voluntary compliance guidelines and the applicable compliance guidance promulgated by the federal government or otherwise restrict payments that may be made to healthcare providers and other potential referral sources; state laws that require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures; and state laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

If our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including civil and criminal penalties, damages, fines, exclusion from participation in government health care programs, such as Medicare and Medicaid, imprisonment, and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our financial results. Any action against us for violation of these laws, even if we successfully defend against it, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business. Moreover, achieving and sustaining compliance with applicable federal and state privacy, security and fraud and abuse laws may prove costly.

Risks Related to Our Common Stock and This Offering

The price of our common stock may be volatile, and you may not be able to resell your shares at or above the initial public offering price.

The initial public offering price for the shares of our common stock sold in this offering has been determined by negotiation between the underwriters and us. This price may not reflect the market price of our common stock following this offering. You may be unable to sell your shares of common stock at or above the initial public offering price due to fluctuations in the market price of our common stock. Factors that could cause volatility in the market price of our common stock include, but are not limited to:

- ability to commercialize or obtain regulatory approval for our product candidates, or delays in commercializing or obtaining regulatory approval;

- results from, or any delays in, preclinical or nonclinical testing or clinical trial programs relating to our product candidates, including the Phase 1 clinical trial for MRX34;
- any need to suspend or discontinue clinical trials due to side effects or other safety risks, or any need to conduct studies on the long-term effects associated with the use of our product candidates;
- manufacturing issues related to our product candidates for clinical trials or future products for commercialization;
- commercial success and market acceptance of our product candidates following regulatory approval;
- undesirable side effects caused by product candidates after they have entered the market;
- ability to discover, develop and commercialize additional product candidates;
- announcements relating to collaborations that we may enter into with respect to the development or commercialization of our product candidates;
- announcements relating to the receipt, modification or termination of government contracts or grants;
- success of our competitors in discovering, developing or commercializing products;
- strategic transactions undertaken by us;
- additions or departures of key personnel;
- product liability claims related to our clinical trials or product candidates;
- prevailing economic conditions;
- business disruptions caused by earthquakes or other natural disasters;
- disputes concerning our intellectual property or other proprietary rights;
- FDA or other U.S. or foreign regulatory actions affecting us or our industry;
- healthcare reform measures in the United States;
- sales of our common stock by our officers, directors or significant stockholders;
- future sales or issuances of equity or debt securities by us;
- fluctuations in our quarterly operating results; and
- the issuance of new or changed securities analysts' reports or recommendations regarding us.

In addition, the stock markets in general, and the markets for pharmaceutical, biopharmaceutical and biotechnology stocks in particular, have experienced extreme volatility that have been often unrelated to the operating performance of the issuer. These broad market fluctuations may adversely affect the trading price or liquidity of our common stock. In the past, when the market price of a stock has been volatile, holders of that stock have sometimes instituted securities class action litigation against the issuer. If any of our stockholders were to bring such a lawsuit against us, we could incur substantial costs defending the lawsuit and the attention of our management would be diverted from the operation of our business.

Our principal stockholders and management own a significant percentage of our stock and will be able to exert significant control over matters subject to stockholder approval.

Based on the beneficial ownership of our common stock as of June 30, 2015, after this offering, our officers and directors, together with holders of 5% or more of our outstanding common stock before this offering and their respective affiliates, will beneficially own approximately % of our common stock (assuming no exercise of the underwriters' option to purchase additional shares of common stock). Accordingly, these stockholders will continue to have significant influence over the outcome of corporate actions requiring stockholder approval, including the election of directors, any merger, consolidation or sale of all or substantially all of our assets or any other significant corporate transaction. The interests of these stockholders may not be the same as or may even conflict with your interests. For example, these stockholders could delay or prevent a change of control of our company, even if such a change of control would benefit our other stockholders, which could deprive our stockholders of an opportunity to receive a premium for their common stock as part of a sale of our company or our assets and might affect the prevailing market price of our common stock. The significant concentration of stock ownership may adversely affect the trading price of our common stock due to investors' perception that conflicts of interest may exist or arise.

We are an "emerging growth company" and we cannot be certain if the reduced disclosure requirements applicable to emerging growth companies will make our common stock less attractive to investors.

We are an "emerging growth company," as defined in the JOBS Act, and may take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not "emerging growth companies" including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and shareholder approval of any golden parachute payments not previously approved. We cannot predict if investors will find our common stock less attractive because we may rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

In addition, Section 102 of the JOBS Act also provides that an "emerging growth company" can take advantage of the extended transition period provided in Section 7(a)(2)(B) of the Securities Act of 1933, as amended, or the Securities Act, for complying with new or revised accounting standards. An "emerging growth company" can therefore delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. However, we are choosing to "opt out" of such extended transition period, and as a result, we will comply with new or revised accounting standards on the relevant dates on which adoption of such standards is required for non-emerging growth companies. Section 107 of the JOBS Act provides that our decision to opt out of the extended transition period for complying with new or revised accounting standards is irrevocable.

Future sales of our common stock or securities convertible or exchangeable for our common stock may depress our stock price.

If our existing stockholders or holders of our options sell, or indicate an intention to sell, substantial amounts of our common stock in the public market after the lock-up and legal restrictions on resale discussed in this prospectus lapse, the trading price of our common stock could decline. The perception in the market that these sales may occur could also cause the trading price of our common stock to decline. Based on 153,801,422 shares of common stock outstanding as of June 30, 2015, upon the completion of this offering, we will have outstanding a total of shares of common stock, assuming no exercise of the underwriters' option to purchase additional shares of common stock. Of these shares, only the shares of common stock sold by us in this offering, plus any shares sold upon

exercise of the underwriters' option to purchase additional shares of common stock, will be freely tradable without restriction, unless held by our affiliates, in the public market immediately following this offering.

A total of shares of common stock are not subject to lock-up agreement with the underwriters and therefore will be eligible for sale in the public market 90 days after the date of this prospectus. After the lock-up agreements expire, shares of common stock will be eligible for sale in the public market, subject to volume limitations under Rule 144 under the Securities Act, with respect to shares held by directors, executive officers and other affiliates. The underwriters may, however, in their sole discretion, permit our officers, directors and other stockholders and the holders of our outstanding options who are subject to the lock-up agreements to sell shares prior to the expiration of the lock-up agreements. Sales of these shares, or perceptions that they will be sold, could cause the trading price of our common stock to decline.

In addition, based on the number of shares subject to outstanding awards under our 2008 Long Term Incentive Plan, or 2008 Plan, or available for issuance thereunder, as of June 30, 2015, and including the initial reserves under our 2015 Equity Incentive Award Plan, or 2015 Plan, shares of common stock that are either subject to outstanding options, outstanding but subject to vesting, or reserved for future issuance under the 2008 Plan or 2015 Plan will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules, the lock-up agreements and Rule 144 and Rule 701 under the Securities Act. We also plan to file a registration statement permitting certain shares of common stock issued in the future pursuant to the 2008 Plan and 2015 Plan to be freely resold by plan participants in the public market, subject to the lock-up agreements, applicable vesting schedules and, for shares held by directors, executive officers and other affiliates, volume limitations under Rule 144 under the Securities Act. The 2015 Plan also contains provisions for the annual increase of the number of shares reserved for issuance under such plans, as described elsewhere in this prospectus, which shares we also intend to register. If the shares we may issue from time to time under the 2008 Plan or 2015 Plan are sold, or if it is perceived that they will be sold, by the award recipient in the public market, the trading price of our common stock could decline.

Certain holders of approximately 152.4 million shares of our common stock at June 30, 2015 will be entitled to rights with respect to the registration of their shares under the Securities Act, subject to the lock-up agreements described above. See "Description of Capital Stock—Registration Rights." Registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act, except for shares purchased by affiliates. Sales of such shares could also cause the trading price of our common stock to decline.

If there is no viable public market for our common stock, you may not be able to sell your shares at or above the initial public offering price.

Prior to this offering, there has been no public market for our common stock, and there can be no assurance that a regular trading market will develop and continue after this offering or that the market price of our common stock will not decline below the initial public offering price. The initial public offering price was determined through negotiations between us and the underwriters and may not be indicative of the market price of our common stock following this offering. Among the factors considered in such negotiations were prevailing market conditions, certain of our financial information, market valuations of other companies that we and the underwriters believe to be comparable to us, estimates of our business potential, the present state of our development and other factors deemed relevant. See "Underwriting" for additional information.

Investors in this offering will suffer immediate and substantial dilution of their investment.

If you purchase common stock in this offering, you will pay more for your shares than our pro forma as adjusted net tangible book value per share. Based upon an assumed initial public offering price of $ per share, the midpoint of the range on the cover page of this prospectus, you will incur immediate and substantial dilution of $ per share, representing the difference between our assumed initial public offering price and our pro forma as adjusted net tangible book value per share. Based upon the assumed initial public offering price of $ per share, purchasers of common stock in this offering will have contributed approximately % of the aggregate purchase price paid by all purchasers of our stock but will own only approximately % of our common stock outstanding after this offering. For information on how the foregoing amounts were calculated, see "Dilution."

To the extent outstanding stock options are exercised, there will be further dilution to new investors.

We issued options in the past to acquire common stock at prices significantly below the initial offering price. As of June 30, 2015, there were 12,280,909 shares of common stock subject to outstanding options with a weighted-average exercise price of $0.37 per share. To the extent that these outstanding options are ultimately exercised, you will incur further dilution, and our stock price may decline.

Our quarterly operating results may fluctuate significantly or may fall below the expectations of investors or securities analysts, each of which may cause our stock price to fluctuate or decline.

We expect our operating results to be subject to quarterly fluctuations. Our net loss and other operating results will be affected by numerous factors, including:

- variations in the level of expenses related to our product candidates or future development programs;
- if MRX34 or any other product candidate receives regulatory approval, the level of underlying demand for these product candidates;
- addition or termination of clinical trials or funding support;
- receipt, modification or termination of government contracts or grants, and the timing of payments we receive under these arrangements;
- our execution of any collaborative, licensing or similar arrangements, and the timing of payments we may make or receive under these arrangements;
- any intellectual property infringement lawsuit or opposition, interference or cancellation proceeding in which we may become involved; and
- regulatory developments affecting our product candidates or those of our competitors.

If our quarterly operating results fall below the expectations of investors or securities analysts, the price of our common stock could decline substantially. Furthermore, any quarterly fluctuations in our operating results may, in turn, cause the price of our stock to fluctuate substantially. We believe that quarterly comparisons of our financial results are not necessarily meaningful and should not be relied upon as an indication of our future performance.

We will have broad discretion in the use of the net proceeds of this offering and may not use them effectively.

We discuss our plan for the use of the net proceeds of this offering in the sections entitled "Use of Proceeds" and "Business." However, within the scope of our plan, and in light of the various risks to our business that are set forth in this section, our management will have broad discretion over the use of the net proceeds from this offering. Because of the number and variability of factors that will

determine our use of such proceeds, you may not agree with how we allocate or spend the proceeds from this offering. We may pursue collaborations or clinical trials that do not result in an increase in the market value of our common shares and that may increase our losses. Our failure to allocate and spend the net proceeds from this offering effectively would have a material adverse effect on our business, financial condition and results of operations. Until the net proceeds are used, they may be placed in investments that do not produce significant investment returns or that may lose value.

Provisions of our charter documents or Delaware law could delay or prevent an acquisition of our company, even if the acquisition would be beneficial to our stockholders, and could make it more difficult for you to change management.

Provisions in our amended and restated certificate of incorporation and our amended and restated bylaws that will become effective upon the closing of this offering may discourage, delay or prevent a merger, acquisition or other change in control that stockholders may consider favorable, including transactions in which stockholders might otherwise receive a premium for their shares. In addition, these provisions may frustrate or prevent any attempt by our stockholders to replace or remove our current management by making it more difficult to replace or remove our board of directors. These provisions include:

- a classified board of directors so that not all directors are elected at one time;
- a prohibition on stockholder action through written consent;
- no cumulative voting in the election of directors;
- the exclusive right of our board of directors to elect a director to fill a vacancy created by the expansion of the board of directors or the resignation, death or removal of a director;
- a requirement that special meetings of stockholders be called only by the board of directors, the chairman of the board of directors, the chief executive officer or, in the absence of a chief executive officer, the president;
- an advance notice requirement for stockholder proposals and nominations;
- the authority of our board of directors to issue preferred stock with such terms as our board of directors may determine; and
- a requirement of approval of not less than $66^{2}/_{3}\%$ of all outstanding shares of our capital stock entitled to vote to amend any bylaws by stockholder action, or to amend specific provisions of our certificate of incorporation.

In addition, Delaware law prohibits a publicly held Delaware corporation from engaging in a business combination with an interested stockholder, generally a person who, together with its affiliates, owns or within the last three years has owned 15% or more of our voting stock, for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. Accordingly, Delaware law may discourage, delay or prevent a change in control of our company. Furthermore, our amended and restated certificate of incorporation will specify that the Court of Chancery of the State of Delaware will be the sole and exclusive forum for most legal actions involving actions brought against us by stockholders. We believe this provision benefits us by providing increased consistency in the application of Delaware law by chancellors particularly experienced in resolving corporate disputes, efficient administration of cases on a more expedited schedule relative to other forums and protection against the burdens of multi-forum litigation. However, the provision may have the effect of discouraging lawsuits against our directors and officers. The enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that, in connection with any applicable action brought against us, a court could find the choice of forum

provisions contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable in such action.

Provisions in our charter and other provisions of Delaware law could limit the price that investors are willing to pay in the future for shares of our common stock.

Our employment agreements with our officers may require us to pay severance benefits to any of those persons who are terminated in connection with a change of control of us, which could harm our business, financial condition or results of operations.

Our officers are parties to employment agreements providing for aggregate cash payments of up to approximately $0.8 million at June 30, 2015 for severance and other benefits in the event of a termination of employment in connection with a change of control of us. The payment of these severance benefits could harm our business, financial condition and results of operations. In addition, these potential severance payments may discourage or prevent third parties from seeking a business combination with us.

We do not anticipate paying any cash dividends on our common stock in the foreseeable future; therefore, capital appreciation, if any, of our common stock will be your sole source of gain for the foreseeable future.

We have never declared or paid cash dividends on our common stock. We do not anticipate paying any cash dividends on our common stock in the foreseeable future. We currently intend to retain all available funds and any future earnings to fund the development and growth of our business. In addition, the terms of any future debt financing arrangement may contain terms prohibiting or limiting the amount of dividends that may be declared or paid on our common stock. As a result, capital appreciation, if any, of our common stock will be your sole source of gain for the foreseeable future.

If securities or industry analysts do not publish research, or publish inaccurate or unfavorable research, about our business, our stock price and trading volume could decline.

The trading market for our common stock will depend, in part, on the research and reports that securities or industry analysts publish about us or our business. Securities and industry analysts do not currently, and may never, publish research on our company. If no securities or industry analysts commence coverage of our company, the trading price for our common stock would likely be negatively impacted. In the event securities or industry analysts initiate coverage, if one or more of the analysts who cover us downgrade our common stock or publish inaccurate or unfavorable research about our business, our stock price would likely decline. In addition, if our operating results fail to meet the forecast of analysts, our stock price would likely decline. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, demand for our common stock could decrease, which might cause our stock price and trading volume to decline.

Changes in, or interpretations of, accounting rules and regulations could result in unfavorable accounting charges or require us to change our compensation policies.

Accounting methods and policies for biopharmaceutical companies, including policies governing revenue recognition, research and development and related expenses and accounting for stock-based compensation, are subject to further review, interpretation and guidance from relevant accounting authorities, including the SEC. Changes to, or interpretations of, accounting methods or policies may require us to reclassify, restate or otherwise change or revise our financial statements, including those contained in this prospectus.

Special Note Regarding Forward-Looking Statements

This prospectus contains forward-looking statements concerning our business, operations and financial performance and condition, as well as our plans, objectives and expectations for our business operations and financial performance and condition. Any statements contained herein that are not statements of historical facts may be deemed to be forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as "aim," "anticipate," "assume," "believe," "contemplate," "continue," "could," "due," "estimate," "expect," "goal," "intend," "may," "objective," "plan," "predict," "potential," "positioned," "seek," "should," "target," "will," "would" and other similar expressions that are predictions of or indicate future events and future trends, or the negative of these terms or other comparable terminology. These forward-looking statements include, but are not limited to, statements about:

- the initiation, cost, timing, progress and results of our research and development activities, preclinical and nonclinical studies and future clinical trials;
- our ability to obtain and maintain regulatory approval of our future product candidates, and any related restrictions, limitations and/or warnings in the label of an approved product candidate;
- our ability to obtain funding for our operations;
- our plans to research, develop and commercialize our future product candidates;
- our ability to attract collaborators with development, regulatory and/or commercialization expertise;
- our ability to obtain and maintain intellectual property protection for our current and future product candidates;
- the size and growth potential of the markets for our future product candidates, and our ability to serve those markets;
- our ability to successfully commercialize our product candidates;
- the rate and degree of market acceptance of our product candidates;
- our ability to develop sales and marketing capabilities, whether alone or with potential future collaborators;
- regulatory developments in the United States and foreign countries;
- the performance of our third-party suppliers and manufacturers;
- the success of competing therapies that are or become available;
- our ability to retain key scientific or management personnel;
- our expectations regarding the time during which we will be an emerging growth company under the JOBS Act;
- our use of the proceeds from this offering; and
- the accuracy of our estimates regarding expenses, future revenues, capital requirements and need for additional financing.

These forward-looking statements are based on management's current expectations, estimates, forecasts, and projections about our business and the industry in which we operate and management's beliefs and assumptions and are not guarantees of future performance or development and involve known and unknown risks, uncertainties, and other factors that are in some cases beyond our control. As a result, any or all of our forward-looking statements in this prospectus may turn out to be

inaccurate. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed under "Risk Factors" and elsewhere in this prospectus. Potential investors are urged to consider these factors carefully in evaluating the forward-looking statements. These forward-looking statements speak only as of the date of this prospectus. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future. You should, however, review the factors and risks we describe in the reports we will file from time to time with the SEC after the date of this prospectus. See "Where You Can Find More Information."

Use of Proceeds

We estimate that the net proceeds from the sale of shares of common stock in this offering will be approximately $ million at an assumed initial public offering price of $ per share, the midpoint of the range set forth on the cover page of this prospectus, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. If the underwriters exercise their over-allotment option in full, we estimate that net proceeds will be approximately $ million after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus) would increase (decrease) the net proceeds to us from this offering, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same. We may also increase or decrease the number of shares we are offering. An increase (decrease) of 1,000,000 in the number of shares we are offering would increase (decrease) the net proceeds to us from this offering, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, by approximately $ million, assuming the assumed initial public offering price stays the same. We do not expect that a change in the offering price or the number of shares by these amounts would have a material effect on our intended uses of the net proceeds from this offering, although it may impact the amount of time prior to which we may need to seek additional capital.

At June 30, 2015, we had cash and cash equivalents of $41.6 million. We currently estimate that we will use the net proceeds from this offering, together with our existing cash and cash equivalents, as follows:

- approximately $53.0-$65.0 million to fund clinical development expenses for our lead program, MRX34, which includes
  - approximately $13.0-$17.0 million to complete the Phase 1 clinical trial, including expansion cohorts on multiple indications and/or changes in protocol,
  - approximately $14.0-$18.0 million to initiate the Phase 2 clinical trial for an indication to be determined, and
  - approximately $26.0-$30.0 million to fund preclinical and clinical studies for the use of MRX34 in additional indications or in combination with standard of care drugs,
- approximately $21.0-$27.0 million to fund preclinical and clinical studies for a second product candidate using another to be determined mimic product, and
- the remainder for preclinical studies, working capital and other general corporate purposes, which may include pursuit of our other research and discovery efforts, expenditures on intellectual property and the acquisition or in-license of other products, product candidates or technologies.

This expected use of net proceeds from this offering and our existing cash and cash equivalents represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. The amounts and timing of our actual expenditures may vary significantly depending on numerous factors, including the progress of our development, the status of and results from preclinical testing or clinical trials, as well as any collaborations that we may enter into with third parties for our product candidates, and any unforeseen cash needs. As a result, our management will retain broad discretion over the allocation of the net proceeds from this offering. Due to the many variables inherent to the development of our product candidates, we cannot currently predict the stage of development we expect the net proceeds of this

offering to enable us to achieve for our clinical studies and product candidates. We have no current agreements, commitments or understandings for any material acquisitions or licenses of any products, businesses or technologies.

Based on our planned use of the net proceeds from this offering and our existing cash and cash equivalents described above, we estimate that such funds will be sufficient to fund operations at least over the next 12 months.

Pending our use of the net proceeds from this offering, we intend to invest the net proceeds in a variety of capital preservation investments, including short-term, investment-grade, interest-bearing instruments and U.S. government securities.

Dividend Policy

We have never declared or paid cash dividends on our capital stock. We intend to retain all available funds and any future earnings, if any, to fund the development and expansion of our business and we do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to dividend policy will be made at the discretion of our board of directors and will depend upon, among other factors, our results of operations, financial condition, capital requirements, contractual restrictions, business prospects and other factors our board of directors may deem relevant.

Capitalization

The following table sets forth our capitalization at June 30, 2015:

- on an actual basis;
- on a pro forma basis to give effect to:
  - the conversion of all outstanding shares of our preferred stock into an aggregate of 152,396,065 shares of common stock immediately prior to the consummation of this offering; and
  - the filing and effectiveness of our amended and restated certificate of incorporation, which will occur immediately prior to the consummation of this offering; and
- on a pro forma as adjusted basis to give further effect to:
  - the issuance and sale by us of shares of our common stock in this offering at an assumed initial public offering price of $ per share (the midpoint of the range set forth on the cover page of this prospectus), after deducting the underwriting discounts and commissions and estimated offering expenses payable by us; and
  - the issuance of shares of common stock issuable to the holders of Series C convertible preferred stock and Series D convertible preferred stock under the terms of our certificate of incorporation as a result of the accruing paid-in-kind dividend in connection with the conversion of all shares of Series C convertible preferred stock and Series D convertible preferred stock into shares of common stock immediately prior to the consummation of this offering based on an assumed initial public offering price of $ per share (the midpoint of the range set forth on the cover page of this prospectus).

You should read this information together with our audited financial statements and related notes appearing elsewhere in this prospectus and the information set forth under the headings "Selected

Financial Data" and "Management's Discussion and Analysis of Financial Condition and Results of Operations."

	At June 30, 2015		
	Actual	Pro Forma	Pro Forma As Adjusted
	(unaudited; in thousands, except share and per share data)		
Series A convertible preferred stock, $0.001 par value per share, 3,192,083 shares designated, 3,192,083 shares issued and outstanding, actual; no shares designated, no shares issued and outstanding, pro forma and pro forma as adjusted	$ 6,384	$ —	
Series B convertible preferred stock, $0.001 par value per share, 540,341 shares designated, 540,341 shares issued and outstanding, actual; no shares designated, no shares issued and outstanding, pro forma and pro forma as adjusted	1,500	—	
Series B-1 convertible preferred stock, $0.001 par value per share, 10,914,647 shares designated, 10,914,647 shares issued and outstanding, actual; no shares designated, no shares issued and outstanding, pro forma and pro forma as adjusted	7,498	—	
Series C convertible preferred stock, $0.001 par value per share, 69,353,712 shares designated, 69,353,695 shares issued and outstanding, actual; no shares designated, no shares issued and outstanding, pro forma and pro forma as adjusted	41,295	—	
Series D convertible preferred stock, $0.001 par value per share, 73,649,755 shares designated, 68,395,299 shares issued and outstanding, actual; no shares designated, no shares issued and outstanding, pro forma and pro forma as adjusted	42,604	—	
Stockholders' equity (deficit):			
Preferred stock, $0.001 par value per share; no shares designated, issued and outstanding, actual; shares designated, no shares issued and outstanding, pro forma and pro forma as adjusted	—	—	
Common stock, $0.001 par value per share; 175,100,000 shares authorized; 1,405,357 shares issued and outstanding, actual; 175,100,000 shares authorized, 153,801,422 shares issued and outstanding, pro forma; shares authorized, shares issued and outstanding, pro forma as adjusted	1	154	
Additional paid-in capital	—	99,128	
Accumulated deficit	(60,191)	(60,191)	
Total stockholders' (deficit) equity	(60,190)	39,091	
Total capitalization	$ 39,091	$ 39,091	

Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, the midpoint of the range set forth on the cover page of this prospectus, would increase (decrease) each of pro forma as adjusted additional paid-in capital, stockholders' equity and total capitalization by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same. We may also increase or decrease the number of shares we are offering. An increase (decrease) of 1,000,000 in the number of shares we are offering would increase (decrease) each of pro forma as adjusted additional paid-in capital, stockholders' equity and total capitalization by approximately $ million, assuming the assumed initial public offering price per share, as set forth on the cover page of this prospectus, remains the same. The pro forma as

adjusted information is illustrative only, and we will adjust this information based on the actual initial public offering price and other terms of this offering determined at pricing.

The outstanding share information in the table above excludes the following:

- 12,280,909 shares of common stock issuable upon the exercise of outstanding stock options having a weighted-average exercise price of $0.26 per share;
- 2,264,241 shares of common stock reserved for issuance pursuant to future awards under our 2008 Long Term Incentive Plan, as amended, which will become available for issuance under our 2015 Equity Incentive Award Plan after consummation of this offering; and
- shares of common stock reserved for issuance pursuant to future awards under our 2015 Equity Incentive Award Plan, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the consummation of this offering.

Dilution

If you invest in our common stock, your interest will be diluted to the extent of the difference between the initial public offering price per share of our common stock in this offering and the net tangible book value per share of our common stock after this offering. At June 30, 2015, we had a historical net tangible book value (deficit) of $(60.2) million, or $(42.84) per share of common stock. Our net tangible book value represents total tangible assets less total liabilities and convertible preferred stock, all divided by the number of shares of common stock outstanding on June 30, 2015. Our pro forma net tangible book value at June 30, 2015, before giving effect to this offering, was $39.1 million, or $0.25 per share of our common stock. Pro forma net tangible book value, before the issuance and sale of shares in this offering, gives effect to:

- the conversion of all outstanding shares of our preferred stock into an aggregate of 152,396,065 shares of common stock immediately prior to the consummation of this offering; and

- the filing and effectiveness of our amended and restated certificate of incorporation, which will occur immediately prior to the consummation of this offering.

After giving effect to the sale of shares of common stock in this offering at an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus) and after deducting the underwriting discounts and commissions and estimated offering expenses, our pro forma as adjusted net tangible book value at June 30, 2015 would have been approximately $ million, or $ per share. This represents an immediate increase in pro forma as adjusted net tangible book value of $ per share to existing stockholders and an immediate dilution of $ per share to new investors. The following table illustrates this per share dilution:

Assumed initial public offering price per share		$
Historical net tangible book value per share at June 30, 2015	$ (42.84)	
Pro forma increase in net tangible book value per share	43.09	
Pro forma net tangible book value per share at June 30, 2015	0.25	
Increase in pro forma net tangible book value per share attributable to new investors		
Pro forma as adjusted net tangible book value per share after this offering		
Dilution per share to new investors participating in this offering		$

A $1.00 increase (decrease) in the assumed initial public offering price of $ per share, the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) our pro forma as adjusted net tangible book value at June 30, 2015 after this offering by approximately $ million, or approximately $ per share, and would decrease (increase) dilution to investors in this offering by approximately $ per share, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. An increase (decrease) of 1,000,000 in the number of shares we are offering would increase (decrease) our pro forma as adjusted net tangible book value at June 30, 2015 after this offering by approximately $ million, or approximately $ per share, and would decrease (increase) dilution to investors in this offering by approximately $ per share, assuming the assumed initial public offering price per share remains the same, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. The pro forma as adjusted information is illustrative only, and we will adjust this information based on the actual initial public offering price and other terms of this offering determined at pricing.

If the underwriters fully exercise their over-allotment option, pro forma as adjusted net tangible book value after this offering would increase to approximately $ per share, and there would be an immediate dilution of approximately $ per share to new investors.

To the extent that outstanding options with an exercise price per share that is less than the pro forma as adjusted net tangible book value per share, before giving effect to the issuance and sale of shares in this offering, are exercised, new investors will experience further dilution.

In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

The following table shows, at June 30, 2015, on a pro forma as adjusted basis, after giving effect to the pro forma adjustments described above, the number of shares of common stock purchased from us, the total consideration paid to us and the average price paid per share by existing stockholders and by new investors purchasing common stock in this offering at an assumed initial public offering price of $ per share, before deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

	Shares Purchased		Total Consideration		Average Price Per Share
	Number	Percent	Amount	Percent	
Existing stockholders		%	$	%	$
Investors participating in this offering					$
Total		100%	$	100%	

The number of shares of common stock to be outstanding after this offering is based on the number of shares outstanding at June 30, 2015 and excludes the following:

- 12,280,909 shares of common stock issuable upon the exercise of outstanding stock options having a weighted-average exercise price of $0.37 per share;
- 2,264,241 shares of common stock reserved for issuance pursuant to future awards under our 2008 Long Term Incentive Plan, as amended, which will become available for issuance under our 2015 Equity Incentive Award Plan after consummation of this offering; and
- shares of common stock reserved for issuance pursuant to future awards under our 2015 Equity Incentive Award Plan, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under this plan, which will become effective immediately prior to the consummation of this offering.

Selected Financial Data

The following selected statement of operations data for the years ended December 31, 2012, 2013 and 2014, and the selected balance sheet data at December 31, 2013 and 2014 have been derived from our audited financial statements included elsewhere in this prospectus. The balance sheet data at December 31, 2012 have been derived from our audited financial statements not included in this prospectus. The statement of operations data for the six months ended June 30, 2014 and 2015 and balance sheet data at June 30, 2015 have been derived from our unaudited financial statements included elsewhere in this prospectus. Our unaudited financial statements are prepared on the same basis as our audited financial statements. Our historical results for any prior period are not necessarily indicative of results to be expected in any future period, and results for the six months ended June 30, 2015 are not necessarily indicative of results to be expected for the full year ending December 31, 2015.

The information set forth below should be read in conjunction with the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section of this prospectus and with our financial statements and notes thereto included elsewhere in this prospectus.

	Year Ended December 31,			Six Months Ended June 30,	
	2012	2013	2014	2014	2015
	(in thousands, except share and per share data)				
Statement of Operations Data:					
Operating expenses:					
Research and development	$ 2,742	$ 4,391	$ 10,545	$ 4,256	$ 7,924
General and administrative	1,562	2,384	3,369	1,777	2,039
Write-off of offering expenses	—	—	1,920	—	—
Total operating expenses	4,304	6,775	15,834	6,033	9,963
Other income (expense):					
Change in fair value of option liability	—	339	—	—	—
Gain on extinguishment of note payable	1,001	—	—	—	—
Interest expense	(355)	—	—	—	—
Net loss	$ (3,658)	$ (6,436)	$ (15,834)	$ (6,033)	$ (9,963)
Less: Accretion and dividends on convertible preferred stock	(6,142)	(2,324)	(2,824)	(1,400)	(2,662)
Net loss attributable to common stockholders	$ (9,800)	$ (8,760)	$ (18,658)	$ (7,433)	$ (12,625)
Net loss per share attributable to common stockholders, basic and diluted	$ (373.52)	$ (293.92)	$ (19.40)	$ (11.09)	$ (9.34)
Common shares used to compute basic and diluted net loss per share attributable to common stockholders	26,237	29,804	961,963	670,035	1,351,526
Pro forma net loss per common share (unaudited)—basic and diluted			$ (0.19)		$ (0.08)
Common shares used to compute pro forma net loss per share (unaudited)—basic and diluted			84,962,729		118,952,196

	At December 31,			At June 30,
	2012	2013	2014	2015
	(in thousands)			
Balance Sheet Data:				
Cash and cash equivalents	$ 13,266	$ 23,182	$ 9,319	$ 41,579
Total assets	13,706	23,684	9,825	42,187
Total liabilities	4,364	1,145	2,499	3,096
Convertible preferred stock	33,710	52,453	55,277	99,281
Common stock	—	—	1	1
Additional paid-in capital	—	890	—	—
Accumulated deficit	(24,368)	(30,804)	(47,952)	(60,191)
Total stockholders' (deficit) equity	(24,368)	(29,914)	(47,951)	(60,190)

Management's Discussion and Analysis of Financial Condition and Results of Operations

You should read the following discussion and analysis of financial condition and results of operations together with the section entitled "Selected Financial Data" and our financial statements and related notes included elsewhere in this prospectus. This discussion and other parts of this prospectus contain forward-looking statements that involve risk and uncertainties, such as statements of our plans, objectives, expectations and intentions. Our actual results could differ materially from those discussed in these forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those discussed in the "Risk Factors" section.

Overview

We are a clinical-stage biopharmaceutical company developing a broad pipeline of microRNA-based oncology therapeutics. microRNAs are naturally occurring, short ribonucleic acid, or RNA, molecules, or oligonucleotides, that play a critical role in regulating key biological pathways. Misexpression of even a single microRNA can contribute to disease development and tumor suppressor microRNAs are commonly reduced in cancer. Our scientists and others at leading academic institutions have identified numerous tumor suppressor microRNAs that play key roles in preventing normal cells from becoming cancerous and facilitating proper cancer immunosurveillance. We are developing mimics of naturally occurring microRNAs that are designed to restore this tumor suppressor activity and aid appropriate tumor immune response. This approach is known as microRNA replacement therapy. Our lead product candidate, MRX34, a mimic of naturally occurring microRNA-34 (miR-34) encapsulated in a liposomal nanoparticle formulation, is the first microRNA mimic to enter clinical development and has shown preliminary clinical evidence of anti-tumor activity as a single agent in our ongoing Phase 1 clinical trial. We believe that microRNA mimics represent a new paradigm in cancer therapy and have the potential to create a new, important class of effective cancer drugs, that can potentially be used alone or in combination with other cancer therapeutics. We plan to develop MRX34 as a monotherapy and in combination with other therapeutic modalities, such as targeted therapies and immuno-oncology agents.

We are developing a pipeline of tumor suppressor microRNA mimics. We believe that these mimics have the potential to become promising new oncology therapeutics due to their capacity to regulate many different oncogenes across multiple oncogenic pathways. We believe our technology is supported by a strong intellectual property position, which we continue to expand and strengthen. Our scientists have also discovered functions of microRNAs in numerous diseases other than cancer, which may provide us an opportunity to expand this novel technology into other therapeutic areas of unmet medical need. We believe these microRNAs represent future partnering or diversification opportunities.

We were incorporated in 2007 under the laws of Delaware and were maintained as a wholly-owned subsidiary of our former parent company, Asuragen, Inc., or Asuragen, until the end of 2009, when we became an independent entity.

Our operations have focused on developing our understanding of and capabilities in microRNA biology, identifying potential product candidates, undertaking preclinical studies, initiating and conducting a clinical trial, protecting and enhancing our intellectual property estate and providing general and administrative support for these activities. We have not generated any revenue from product sales and, to date, have funded our operations primarily through the private placement of convertible preferred stock, federal and state government grants and support from our former parent company, Asuragen. From our inception through June 30, 2015, we have raised an aggregate of approximately $101.6 million to fund our operations, of which approximately $89.9 million was from the issuance of preferred stock for cash and assets and approximately $11.7 million was from federal and state grants.

Since our inception, we have incurred significant operating losses. Our net losses were $3.7 million, $6.4 million and $15.8 million for the years ended December 31, 2012, 2013 and 2014, respectively, and $10.0 million for the six months ended June 30, 2015. At June 30, 2015, we had an accumulated deficit of $60.2 million. We expect to continue to incur significant expenses and operating losses over the next several years. Our net losses may fluctuate significantly from quarter to quarter and from year to year. We anticipate that our expenses will increase significantly as we conduct clinical trials for MRX34 and other product candidates; manufacture clinical trial materials; continue to discover, validate and develop additional novel product candidates; expand and protect our intellectual property portfolio; and hire additional development and scientific personnel. In addition, upon the consummation of this offering, we expect to incur additional costs associated with operating as a public company.

Financial Operations Overview

Revenue

We have not generated any revenue from product sales or from collaborations. In the future, we may generate revenue from collaborations and licenses. Revenue may fluctuate from period to period, and the timing and extent of any future revenue will depend on our ability to advance our product candidates through the clinical trial process and to obtain regulatory approval and our ability, or our future partners' ability, to commercialize our product candidates.

Research and Development Expenses

Research and development expenses consist primarily of costs incurred for our research activities, including our drug discovery efforts, and the development of our product candidates, which include the following:

- employee-related expenses, including salaries, benefits, travel and stock-based compensation;
- external research and development expenses incurred under arrangements with third parties, such as contract research organizations, or CROs, consultants and our scientific advisory board;
- lab supplies, and acquiring, developing and manufacturing preclinical study materials in accordance with Good Laboratory Practices;
- costs of clinical trials, including costs for management, investigator fees and related vendors that provide services for the clinical trials;
- costs to manufacture the drug used in the clinical trials in accordance with Good Manufacturing Practices;
- license and milestone fees;
- development and prosecution of intellectual property; and
- costs of facilities, depreciation and other expenses.

Research and development costs are expensed as incurred. In certain circumstances, we will make nonrefundable advance payments to purchase goods and services for future use pursuant to contractual arrangements. In those instances, we defer and recognize an expense in the period that we receive or consume the goods or services.

Our research and development expenses have been offset by proceeds derived from federal and state grants. These government grants, which have supplemented our research efforts on specific projects, generally provide for reimbursement of approved costs, as defined in the terms of the grant awards. The proceeds from these reimbursement grants are treated as a reduction to the associated expenses as the allowable expenses are incurred.

In August 2010, we received a $10.3 million commercialization award from the State of Texas through The Cancer Prevention Research Institute of Texas, or CPRIT. The CPRIT grant was a three-year award that was funded annually, and funding of the grant was completed in January 2014. At June 30, 2015, all proceeds from this grant had been recognized. We accounted for advances received for the award as deferred grant reimbursement. Under the terms of the award, we are required to pay to CPRIT a portion of our revenues from sales of certain products by us, or received from our licensees or sublicensees, at a percentage in the low single digits until the aggregate amount of such payments equals a specified multiple of the grant amount, and thereafter at a rate of less than one percent, subject to our right, under certain circumstances, to make a one-time payment in a specified amount to CPRIT to buy out such payment obligations.

At June 30, 2015, we had three National Institutes of Health, or NIH, grants ongoing with approximately $288,000 incurred and approximately $536,000 still to be incurred on those grants. Two of the grants, with approximately $327,000 still to be incurred, expire on August 31, 2015.

At any point in time, we typically have various early stage research and drug discovery projects ongoing. Our internal resources, employees and infrastructure are not directly tied to any one research or drug discovery project and are typically deployed across multiple projects. As such, we do not maintain information regarding the costs incurred for these early stage research and drug discovery programs on a project-specific basis. However, we have spent and are currently spending the vast majority of our research and development resources on our lead product candidate, MRX34.

Most of our product development programs are at an early stage, and successful development of future product candidates from these programs is highly uncertain and may not result in approved products. The process of conducting preclinical studies and clinical trials necessary to obtain regulatory approval is costly and time consuming, and we expect our research and development expenses to increase for the foreseeable future as we advance our research programs toward the clinic and initiate and continue clinical trials. The probability of success for each product candidate may be affected by numerous factors, including preclinical data, clinical data, competition, manufacturing capability and commercial viability. We anticipate we will make determinations as to which programs to pursue and how much funding to direct to each program on an ongoing basis in response to the scientific and clinical success of each future product candidate, as well as ongoing assessments as to each future product candidate's commercial potential. Completion dates and completion costs can vary significantly for each future product candidate and are difficult to predict. We will need to raise additional capital and may seek strategic alliances in the future in order to advance the various products in the pipeline and other products that may be developed.

General and Administrative Expenses

General and administrative expenses consist primarily of salaries and related benefits, including stock-based compensation, related to our executive, finance and support functions. Other general and administrative expenses include allocated facility-related costs not otherwise included in research and development expenses, travel expenses and professional fees for auditing, tax and legal services. We expect that general and administrative expenses will increase in the future as we expand our operating activities and incur additional costs associated with being a publicly-traded company. These increases will likely include legal fees, accounting fees, directors' and officers' liability insurance premiums and fees associated with investor relations.

Critical Accounting Policies and Estimates

This management's discussion and analysis of financial condition and results of operations is based on our financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States, or GAAP. The preparation of these financial statements

requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the revenue and expenses incurred during the reported periods. On an ongoing basis, we evaluate our estimates and judgments, including those related to accrued expenses, revenue recognition and stock-based compensation. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not apparent from other sources. Changes in estimates are reflected in reported results for the period in which they become known. Actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in the notes to our financial statements appearing in this prospectus, we believe that the following critical accounting policies are most important to understanding and evaluating our reported financial results.

Stock-Based Compensation

We estimate the fair value of our stock-based awards to employees using the Black-Scholes option-pricing model, which requires the input of highly subjective assumptions, including: (1) the expected volatility of our stock; (2) the expected term of the award; (3) the risk-free interest rate; and (4) expected dividends. Due to the lack of a public market for the trading of our common stock and a lack of company-specific historical and implied volatility data, we have based our estimate of expected volatility on the historical volatility of a group of similar companies that are publicly traded. For these analyses, we have selected companies with comparable characteristics to ours, including enterprise value, risk profiles, position within the industry and historical share price information, sufficient to meet the expected life of the stock-based awards. We compute the historical volatility data using the daily closing prices for the selected companies' shares during the equivalent period of the calculated expected term of our stock-based awards. We will continue to apply this process until a sufficient amount of historical information regarding the volatility of our own stock price becomes available. We have estimated the expected life of our employee stock options using the "simplified" method, whereby the expected life equals the average of the vesting term and the original contractual term of the option. The risk-free interest rates for periods within the expected life of the option are based on the U.S. Treasury yield curve in effect during the period the options were granted.

We are also required to estimate forfeitures at the time of grant and revise those estimates in subsequent periods if actual forfeitures differ from estimates. We use historical data to estimate pre-vesting option forfeitures and record stock-based compensation expense only for those awards that are expected to vest. Stock-based compensation expense recognized in the financial statements is based on awards that are ultimately expected to vest.

We have computed the fair value of employee stock options at the date of grant using the following assumptions:

	Year Ended December 31,			Six Months Ended June 30,
	2012	2013	2014	2015
Expected term (years).	4.3 - 6.1	5.6 - 6.1	5.8 - 6.1	5.6 - 6.7
Risk-free interest rate	0.5% - 1.0%	0.9% - 2.0%	1.8% - 2.8%	1.6% - 2.0%
Expected volatility.	80.3% - 85.5%	74.7% - 76.2%	75.3% - 85.4%	79.3% - 84.7%
Expected dividend rate	0.0%	0.0%	0.0%	0.0%

Stock-based compensation expense was allocated as outlined below:

	Year Ended December 31,			Six Months Ended June 30,
	2012	2013	2014	2015
	(in thousands)			
Research and development	$ 6	$ 55	$ 110	$ 81
General administrative	18	108	298	270
Total	$ 24	$ 163	$ 408	$ 351

At June 30, 2015, we had $2.2 million of total unrecognized compensation expense, net of related forfeiture estimates. We expect the impact of our stock-based compensation expense for stock options to grow in future periods due to the potential increases in headcount and the value of our common stock.

JOBS Act

Section 107 of the JOBS Act provides that an emerging growth company can take advantage of the extended transition period provided in Section 7(a)(2)(B) of the Securities Act for complying with new or revised accounting standards. Thus, an emerging growth company can delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We have irrevocably elected not to avail ourselves of this extended transition period and, as a result, we will adopt new or revised accounting standards on the relevant dates on which adoption of such standards is required for other companies.

Results of Operations

Comparison of Six Months Ended June 30, 2014 and 2015:

	Six Months Ended June 30,		Dollar Change	% Change
	2014	2015		
	(in thousands)			
Statement of operations data:				
Operating expenses:				
Research and development, before grant reimbursement	$ 4,293	$ 8,112	$ 3,819	89.0%
Less grant reimbursement	(37)	(188)	(151)	408.1%
Research and development	4,256	7,924	3,668	86.2%
General and administrative	1,777	2,039	262	14.7%
Net loss	$ (6,033)	$ (9,963)	$ (3,930)	65.1%

Research and Development Expenses

Research and development expenses were $7.9 million for the six months ended June 30, 2015, which was an increase of $3.7 million, or 86%, compared to research and development expenses of approximately $4.3 million for the six months ended June 30, 2014.

Research and development spending, prior to the offset of grant reimbursements, was $8.1 million for the six months ended June 30, 2015, which was an increase of approximately $3.8 million, or 89%, compared to research and development spending, prior to the offset of grant reimbursements, of $4.3 million for the six months ended June 30, 2014. The increase in the first quarter of 2015 was primarily due to increased clinical trial costs related to our Phase 1 clinical trial, including a higher number of

patients, additional investigator sites and additional drug costs related to the increased trial activity, and increased intellectual property and licensing costs.

Research and development spending was partially offset by approximately $188,000 of grant reimbursements for the six months ended June 30, 2015, compared to reimbursement of approximately $37,000 for the same period in 2014. The increase was due to a higher volume of work being performed on the research funded by the federal grants.

General and Administrative Expenses

General and administrative expenses were approximately $2.0 million for the six months ended June 30, 2015, which was an increase of approximately $262,000, or 15%, compared to the same period in 2014. The overall expenses remained consistent from quarter to quarter, with an increase in salary and benefits being the primary difference.

Comparison of Years Ended December 31, 2013 and 2014

	Year Ended December 31,		Dollar Change	% Change
	2013	2014		
		(in thousands)		
Statement of operations data:				
Operating expenses:				
Research and development, before grant reimbursement	$ 8,241	$ 10,626	$ 2,385	28.9%
Less grant reimbursement	(3,850)	(81)	3,769	(97.9)%
Research and development	4,391	10,545	6,154	140.2%
General and administrative	2,384	3,369	985	41.3%
Write-off of offering expenses	—	1,920	1,920	NM*
Total operating expenses	6,775	15,834	9,059	133.7%
Other income (expense):				
Change in fair value of option liability	339	—	(339)	(100.0)%
Net loss	$ (6,436)	$ (15,834)	$ (9,398)	146.0%

* Not Meaningful

Research and Development Expenses

Research and development expenses were $10.5 million for the year ended December 31, 2014, which was an increase of $6.2 million, or 140%, compared to research and development expenses of $4.4 million for the year ended December 31, 2013. The net change was due to an increase in overall research and development spending and a significant reduction in grant reimbursement from the prior year.

Research and development spending, prior to offset by grant reimbursement, was $10.6 million for the year ended December 31, 2014, which was an increase of $2.4 million, or 29%, compared to research and development spending of $8.2 million for the year ended December 31, 2013. The increase in research and development spending in 2014 was primarily due to the increased costs for clinical trials. The initiation of our Phase 1 clinical trial was in April 2013. In 2014, the clinical trial costs increased as a result of a full year of clinical trial costs and expansion of testing for additional indications, additional investigator sites, expansion of the trial to overseas locations and a related increase in clinical trial drug costs. The increase was also due to an increase in intellectual property

spending. The increases in overall research and development spending were partially offset by lower licensing costs in 2014.

We offset research and development expenses by approximately $81,000 for the year ended December 31, 2014. This was a decrease from the $3.85 million of grant proceeds received for the year ended December 31, 2013 of approximately $3.77 million, or 98%. The reduction in grant reimbursements was due to the completion of the allowable expense provided for by the grant by the Cancer Prevention and Research Institute of Texas, or CPRIT, during the fourth quarter of 2013.

General and Administrative Expenses

General and administrative expenses were $3.4 million for the year ended December 31, 2014, which was an increase of approximately $1.0 million, or 41%, compared to general and administrative expenses of $2.4 million for the year ended December 31, 2013. The increase year over year was due to increases in headcount and the related salaries and benefits, increases in legal and other professional fees, and general overall spending related to increase activities.

Write-off of Offering Expenses

In August 2014, a proposed offering was delayed and the deferred offering costs for that offering, which consisted of direct incremental legal and professional accounting fees related to that offering, in the amount of $1.92 million were expensed.

Change in Fair Value of Option Liability

In October 2012, we completed an initial closing of an offering of Series C convertible preferred stock. The purchasers of the convertible preferred stock in the initial closing received an option to participate in the second closing for the same number of shares and at the same price as the initial closing. At the time of the initial closing, the fair value of this option to participate in the second closing was calculated using an option pricing model, and the effect of this non-cash accounting adjustment was to record an option liability on the balance sheet for the fair value that was calculated. The option liability is marked to fair value at each reporting period and any changes in fair value are recorded in the statement of operations.

When the second closing of the Series C convertible preferred stock was completed in December 2013, we had a one-time non-cash gain on the change in the fair value of the option and the balance of the option liability was reclassified to additional paid-in capital.

Comparison of Years Ended December 31, 2012 and 2013

	Year Ended December 31,		Dollar Change	% Change
	2012	2013		
	(in thousands)			
Statement of operations data:				
Operating expenses:				
Research and development, before grant reimbursement	$ 6,380	$ 8,241	$ 1,861	29.2%
Less grant reimbursement	(3,638)	(3,850)	(212)	5.8%
Research and development	2,742	4,391	1,649	60.1%
General and administrative	1,562	2,384	822	52.6%
Total operating expenses	4,304	6,775	2,471	57.4%
Other income (expense):				
Change in fair value of option liability	—	339	339	100.0%
Gain on extinguishment of note payable	1,001	—	(1,001)	(100.0)%
Interest expense	(355)	—	355	(100.0)%
Net loss	$ (3,658)	$ (6,436)	$ (2,778)	75.9%

Research and Development Expenses

Research and development expenses were $4.4 million for the year ended December 31, 2013, which was an increase of $1.6 million, or 60%, compared to research and development expenses of $2.7 million for the year ended December 31, 2012. The net change was due to an increase in overall research and development spending.

Research and development spending, prior to offset by grant reimbursement, was $8.2 million for the year ended December 31, 2013, which was an increase of $1.9 million, or 29%, compared to research and development spending of $6.4 million for the year ended December 31, 2012. The increase in research and development spending in 2013 was primarily due to the initiation of our Phase 1 clinical trial in April 2013, including the costs of conducting the trial and adding headcount for clinical operations, and additional spending on intellectual property, including a payment of $1.0 million to Marina Biotech, Inc., or Marina. This increase was partially offset by a decrease in spending for clinical trial drug costs and outsourced preclinical studies that had been conducted in 2012 in anticipation of the submission of the Investigational New Drug, or IND, for MRX34 to the Federal Drug Administration, or FDA, in 2013.

We offset research and development expenses by $3.85 million of grant proceeds for the year ended December 31, 2013 and $3.64 million for the same period in 2012, an increase of approximately $212,000, or 6%. In both 2013 and 2012, over 95% of the total grant proceeds recognized by us related to the CPRIT grant. The increase in grant and research proceeds in 2013 was primarily due to the timing of the expenses being incurred that are reimbursed by state and federal grants.

General and Administrative Expenses

General and administrative expenses were $2.4 million for the year ended December 31, 2013, which was an increase of approximately $0.8 million, or 53%, compared to general and administrative expenses of $1.6 million for the year ended December 31, 2012. Prior to 2013, a number of administrative functions had been provided by our former parent company, Asuragen, including accounting and finance, legal, human resources and purchasing, and the costs for these administrative functions were covered by a shared services agreement between us and Asuragen. Beginning in 2013, these administrative functions were transitioned to us, and the additional costs were incurred related to

these functions, including additional headcount, new systems, professional fees, outside consultants and transition costs. There were also increases in the costs of audit and tax, legal and stock-based compensation from 2012 to 2013.

Change in Fair Value of Option Liability

In October 2012, we completed an initial closing of an offering of Series C convertible preferred stock. The purchasers of the convertible preferred stock in the initial closing received an option to participate in the second closing for the same number of shares and at the same price as the initial closing. At the time of the initial closing, the fair value of this option to participate in the second closing was calculated using an option pricing model, and the effect of this non-cash accounting adjustment was to record an option liability on the balance sheet for the fair value that was calculated. The option liability is marked to fair value at each reporting period and any changes in fair value are recorded in the statement of operations.

When the second closing of the Series C convertible preferred stock was completed in December 2013, we had a one-time non-cash gain on the change in the fair value of the option and the balance of the option liability was reclassified to additional paid-in capital.

Gain on Extinguishment of Note Payable

In conjunction with a unit investment in 2009 from the Texas Emerging Technology Fund, or the TETF, an economic development affiliate of the State of Texas, we issued a note payable and a warrant to purchase our capital stock. The note payable was initially recorded net of the computed debt discount resulting from the warrant value. In October 2012, the arrangement with the TETF was amended. As part of the amendment, our note with the TETF was deemed satisfied in full and canceled and we were released of all repayment obligations. In conjunction with this release, we recognized a gain on the extinguishment of the note payable and related accrued interest of $1.0 million in 2012.

Interest Expense

Interest expense decreased from $355,000 for the year ended December 31, 2012 to zero for the year ended December 31, 2013 due to the extinguishment of the note payable related to the TETF in October 2012. We did not have any debt obligations outstanding during 2013.

Liquidity and Capital Resources

Liquidity and Capital Expenditures

Since inception, at June 30, 2015, our operations have been financed primarily by net proceeds of $89.9 million from the sales of shares of our convertible preferred stock for cash and assets and $11.7 million from federal and state grants. At June 30, 2015, we had $41.6 million of cash and cash equivalents.

Our primary uses of cash are to fund operating expenses, primarily research and development expenditures. Cash used to fund operating expenses is impacted by the timing of when we pay these expenses, as reflected in the change in our outstanding accounts payable and accrued expenses.

We believe that our existing cash and cash equivalents as of June 30, 2015, along with the estimated net proceeds from this offering, will be sufficient to meet our anticipated cash requirements for at least the next 12 months. However, our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement that involves risks and uncertainties, and actual results could vary materially.

Our future capital requirements are difficult to forecast and will depend on many factors, including:

- the initiation, progress, timing and completion of preclinical studies and clinical trials for our lead product and potential product candidates;
- the number and characteristics of product candidates that we pursue;
- the progress, costs and results of our clinical trials;
- the terms and timing of any other strategic alliance, licensing and other arrangements that we may establish;
- the outcome, timing and cost of regulatory approvals;
- delays that may be caused by changing regulatory requirements;
- the costs and timing of hiring new employees to support our continued growth;
- the costs and timing of procuring clinical supplies of our product candidates; and
- the extent to which we acquire or invest in businesses, products or technologies.

The following table shows a summary of our cash flows for the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2014 and 2015.

	Year Ended December 31,			Six Months Ended June 30,	
	2012	2013	2014	2014	2015
		(in thousands)		(unaudited; in thousands)	
Net cash provided by (used in):					
Operating activities	$ (4,520)	$ (6,496)	$ (13,970)	$ (7,411)	$ (9,199)
Investing activities.	—	(7)	(102)	(21)	(58)
Financing activities	16,847	16,419	209	208	41,517
Net increase (decrease)	$ 12,327	$ 9,916	$ (13,863)	$ (7,224)	$ 32,260

Operating Activities

Net cash used in operating activities was $7.4 million and $9.2 million for the six months ended June 30, 2014 and 2015, respectively. The increase in cash used for operating activities of approximately $1.8 million was primarily due to increased salaries, increased spending for clinical trials and intellectual property related expenses, and higher license fees.

Net cash used in operating activities was $14.0 million for the year ended December 31, 2014, compared to net cash used in operations of $6.5 million for the same period in 2013. The increase in 2014 in overall spending in the prior year was primarily due to increased clinical trials related costs, including the higher number of patients, additional sites and related increase in costs of the drug product, and increased spending on intellectual property. The increase was also caused by the lower grant payment from CPRIT, with an annual payment made in 2013.

Investing Activities

The net cash used in investing activities for the periods presented relates entirely to the purchases of property and equipment, primarily computer and lab equipment. For the six months ended June 30, 2014 and 2015, total amounts spent on the purchase of fixed assets were approximately $21,000 and

$58,000, respectively. The amount spent in the years ended December 31, 2013 and 2014 was approximately $7,000 and $102,000, respectively. There were no investing activities in 2012.

Financing Activities

Net cash provided by financing activities was approximately $41.5 million for the six months ended June 30, 2015, which was primarily due to the offering of the our Series D convertible preferred stock. For the six months ended June 30, 2014, approximately $208,000 of net cash provided by financing activities was due to the exercise of stock options.

Net cash provided by financing activities was approximately $209,000 for the year ended December 31, 2014, which was due to the exercise of stock options. For both years ended December 31, 2013 and 2012, the net cash provided by financing activities of $16.4 million and $16.8 million, respectively, was primarily due to the net proceeds from the sale of our Series C convertible preferred stock. The initial funding of the Series C convertible preferred stock was in October 2012 and the second funding was in December 2013.

Contractual Obligations and Commitments

In October 2014, we entered into a sublease agreement and amended an agreement with Asuragen under which we share space with Asuragen and Asuragen provides certain services to us. These services currently include facilities-related services, warehouse services, shipping and receiving and other services. The term of the services agreement expires in August 2016, with commitment for payments remaining under the two agreements totaling approximately $824,000 as of December 31, 2014.

	Payment due by period				
	Total	Less than 1 year	1 - 3 years	3 - 5 years	More than 5 years
	(in thousands)				
Contractual Obligations:					
Sublease Agreement with Asuragen	$ 148	$ 89	$ 59	$ —	$ —
Services Agreement with Asuragen.	676	389	287	—	—
Total	$ 824	$ 478	$ 346	$ —	$ —

Off-balance Sheet Arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements, as defined in the rules and regulations of the Securities and Exchange Commission.

Quantitative and Qualitative Disclosures about Market Risk

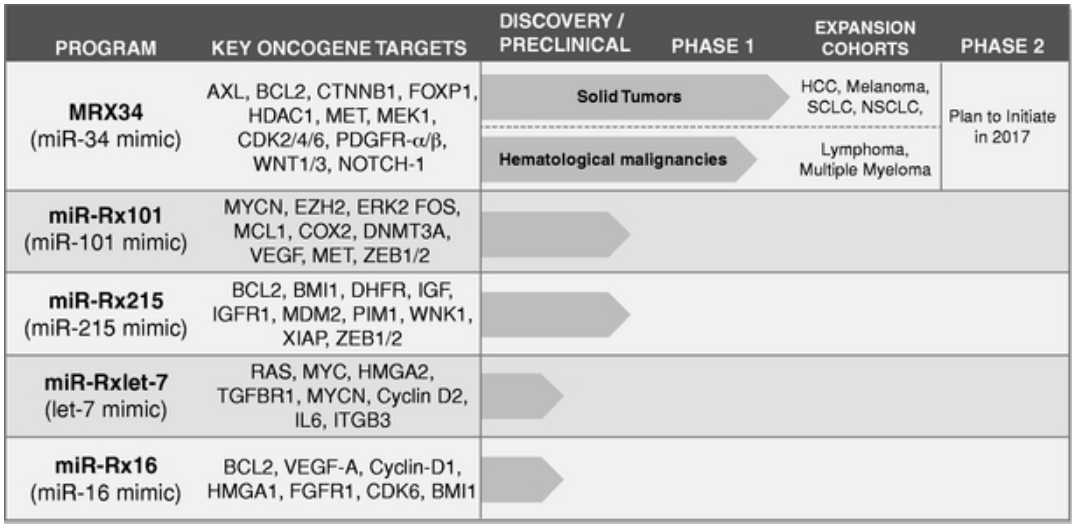
The market risk inherent in our financial instruments and in our financial position represents the potential loss arising from adverse changes in interest rates. At June 30, 2015, we had cash and cash equivalents of $41.6 million, consisting of interest-bearing money market accounts and prime money market funds. Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates. Due to the short-term maturities of our cash equivalents and the low risk profile of our investments, we do not believe a change in interest rates would have a material effect on the fair market value of our cash equivalents.

Business

Overview

We are a clinical-stage biopharmaceutical company developing a broad pipeline of microRNA-based oncology therapeutics. microRNAs are naturally occurring, short ribonucleic acid, or RNA, molecules, or oligonucleotides, that play a critical role in regulating key biological pathways. Misexpression of even a single microRNA can contribute to disease development and tumor suppressor microRNAs are commonly reduced in cancer. Our scientists and others at leading academic institutions have identified numerous tumor suppressor microRNAs that play key roles in preventing normal cells from becoming cancerous and facilitating proper cancer immunosurveillance. We are developing mimics of naturally occurring microRNAs that are designed to restore this tumor suppressor activity and aid appropriate tumor immune response. This approach is known as microRNA replacement therapy. Our lead product candidate, MRX34, a mimic of naturally occurring microRNA-34 (miR-34) encapsulated in a liposomal nanoparticle formulation, is the first microRNA mimic to enter clinical development and has shown preliminary clinical evidence of anti-tumor activity as a single agent in our ongoing Phase 1 clinical trial. We believe that microRNA mimics represent a new paradigm in cancer therapy and have the potential to create a new, important class of effective cancer drugs that can potentially be used alone or in combination with other cancer therapeutics. We plan to develop MRX34 as a monotherapy and in combination with other therapeutic modalities, such as targeted therapies and immuno-oncology agents.

We are developing a pipeline of tumor suppressor microRNA mimics. Each microRNA mimic in our pipeline is designed to replicate the activity of a single tumor suppressor miRNA and regulate the expression of multiple important oncogenes across key oncogenic pathways which can prevent proliferation and induce apoptosis in cancer cells. The potential capacity to simultaneously affect multiple pathways and processes that are critical to cancer cell viability may make mimics of tumor suppressor microRNAs potent anti-cancer agents and less susceptible to drug resistance. We are pursuing or have been granted therapeutic use patent claims related to several tumor suppressor microRNAs as well as composition of matter claims for multiple chemistries and structures that are, or may be used in or are contemplated for use with, our therapeutic microRNA mimics, including miR-34. The following chart provides summary information on the most advanced microRNA mimics in our pipeline:



Our lead product candidate, MRX34, is a miR-34 mimic encapsulated in a liposomal nanoparticle formulation. Our mimic of miR-34 has shown evidence of the potential ability to:

- reduce the proliferation of cultured cancer cells derived from patients with a wide range of malignancies, including liver, lung, colon, pancreatic and breast cancer;
- cause significant tumor regression in multiple mouse models of liver cancer and inhibit tumor growth in mouse models of other cancers;
- reduce the tumor-forming capacity of cancer stem cell populations;
- work in a synergistic manner with different approved cancer therapies to reduce proliferation of cultured cancer cells and cause significant tumor regression in combination with an approved cancer therapy in an aggressive mouse model of liver cancer; and
- repress Programmed death-ligand 1 (PD-L1) protein expression in tumor tissue in a syngeneic mouse model of lung cancer, leading to an increase in active tumor-infiltrating immune cells (CD8+) and a decrease in so-called exhausted tumor-infiltrating immune cells (CD8+PD1+).

In April 2013, we initiated a multi-center, open label dose escalation Phase 1 clinical trial during which we are evaluating two different dosing schedules for MRX34 as a single agent in multiple advanced solid tumors and various types of hematological malignancies.

As of August 13, 2015, 101 patients have been enrolled in the ongoing MRX34 Phase 1 clinical trial at five clinical trial sites in the United States and three sites in Korea. Primary objectives of the Phase 1 clinical trial are to establish the maximum tolerated dose and an appropriate dose for expansion cohorts and future Phase 2 clinical trials. As of August 13, 2015:

- 47 patients have been treated on a twice weekly, or BIW, schedule for three weeks in 28-day cycles until the maximum tolerated dose of MRX34 was found to be 110 mg/m^2 among patients with advanced solid tumors with liver involvement.
- The other 54 patients have been or are being treated daily for five days, or QD × 5, in 21-day cycles. We have not yet determined the maximum tolerated dose of MRX34 with this dosing schedule. Current dose levels are 70 mg/m^2 for primary liver cancer patients, 93 mg/m^2 for other solid tumors and 110 mg/m^2 for hematological malignancies.

Based on observations from the two dosing schedules, we believe the QD × 5 dosing schedule has certain advantages over the BIW schedule such as better safety and tolerability, which we believe may in turn lead to improved efficacy. Therefore, the QD × 5 dosing schedule has been selected for all new patients enrolling in the Phase 1 clinical trial.

Secondary objectives of the clinical trial are to assess the safety, tolerability and pharmacokinetic profile of MRX34 after intravenous dosing as well as to assess any biological and clinical activity. Observations on these secondary objectives include the following:

- The most common adverse events observed to date with MRX34 are similar to those observed with marketed liposomal drug formulations and have been manageable with interventions commonly used by oncologists.
- Quantitative PCR and Next Generation Sequencing (NGS) analyses have demonstrated dose-dependent accumulation and activity of miR-34 in white blood cells from patients treated with MRX34 in the QD × 5 schedule. Consistent with observations from our preclinical studies, MRX34 dosing resulted on average in an approximately 40% reduction in the levels of multiple miR-34 target genes in white blood cells as well as increased levels of p21, a miR-34 inducible tumor suppressor gene.
- Of the 47 BIW cohort patients, which included patients with primary liver cancer or solid tumors with liver involvement (metastases), 38 patients were evaluable for response, based on

availability of baseline and follow-up scans or disease progression as determined by the study investigator. One primary liver cancer patient, still on active study treatment, with a history of hepatitis-B infection and metastases to the lungs enrolled into the 70 mg/m^2 dose cohort on the BIW schedule, and achieved a confirmed partial response after six cycles of treatment per independent radiology review using RECIST (Response Evaluation Criteria in Solid Tumors) criteria. RECIST criteria is the standard method for evaluating solid tumor response in oncology clinical trials. This patient is one of 12 patients with primary liver cancer enrolled to date in Korea. Furthermore, six of the 38 patients showed stable disease varying between two and eight cycles in length, and at different dose levels.

- Of the 54 patients enrolled to date at the same study sites on the QD × 5 dosing schedule, 44 are evaluable for response. Two melanoma patients have been treated to date and enrolled in the 110 mg/m^2 QD × 5 dose cohort. One of these two patients, who had progressed on previous treatments, including ipilimumab (Yervoy) and pembrolizumab (Keytruda), achieved a confirmed partial response after four cycles of MRX34 treatment per independent radiology review using RECIST criteria. Furthermore, 11 of the 44 patients have shown stable disease of varying duration, between two and 16 cycles of treatment, and at various dose levels; this includes one of two SCLC patients enrolled to date, who started MRX34 on the QD × 5 schedule in the 50 mg/m^2 dose cohort in July 2014 as fourth line therapy after extensive previous therapies, and who was treated with MRX34 for 16 cycles.

- Based on preclinical data and observations of clinical activity to date, our dose expansion studies will focus on specific tumor types, namely, different subtypes of primary liver cancer, melanoma, small and non-small cell lung cancer, lymphoma and multiple myeloma.

Once the dose-escalation phase in the QD × 5 dose schedule cohort has been completed, and a recommended dose for the expansion cohorts has been determined, we intend to enroll approximately 100 additional patients across different tumor-specific expansion cohorts, including primary liver cancer, melanoma, small cell and non-small cell lung cancer, lymphoma and multiple myeloma. We expect to complete these expansion cohorts and have multiple study data read-outs by the end of 2016. After consultation with the FDA on study results and the recommended clinical development program going forward, we intend to initiate a Phase 2 clinical trial program in early 2017.

Our pipeline contains multiple tumor suppressor microRNAs that, like miR-34, have demonstrated the ability to inhibit cancer cell proliferation and tumor growth in preclinical studies by co-regulating the expression of multiple oncogenes. The specific set of genes regulated by each tumor suppressor microRNA as well as the ability to deliver these mimics to the target tissue may determine their potential in treating specific types of cancer, and thus the specific clinical development program for each of our pipeline therapeutic product candidates.

Our microRNA Platform

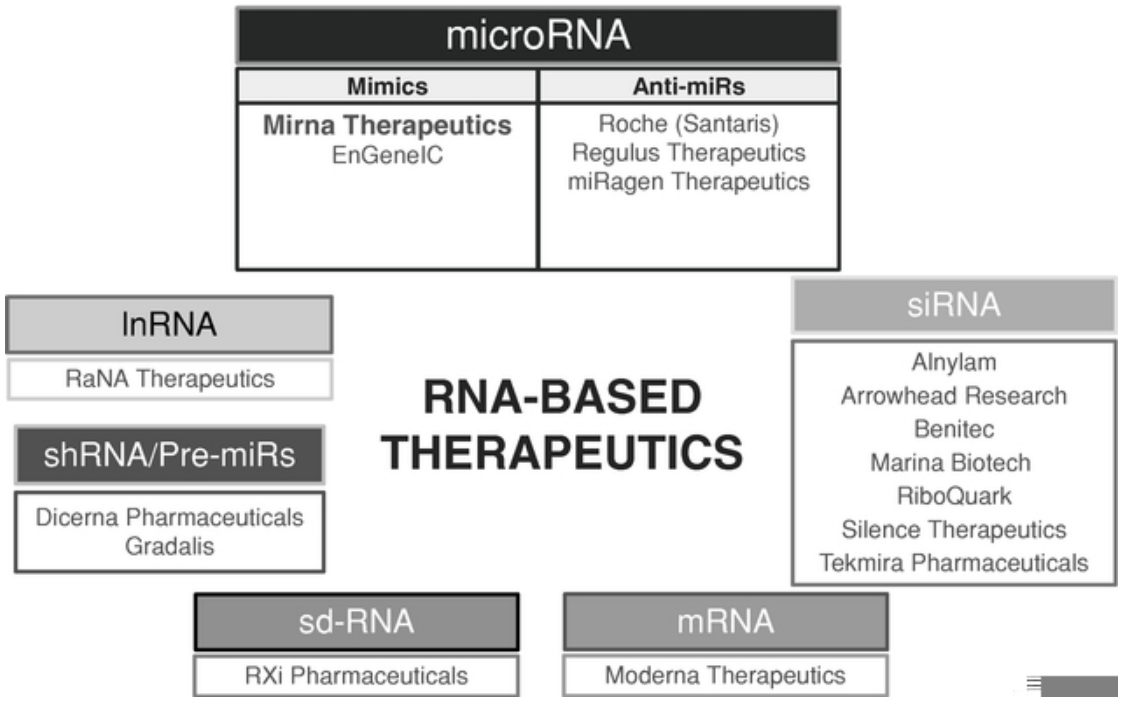
We pioneered the development of therapeutic miRNA mimics that feature two complementary RNA strands that are hybridized to produce a double-stranded RNA. The active strand has a sequence that is identical to a microRNA normally expressed in a cell, while the second, passenger strand is modified to facilitate proper loading of the active strand onto the cytoplasmic protein complex necessary for microRNA function inside the cells. While similar in structure, microRNA mimics are clearly differentiated from small interfering RNAs (siRNAs) through their biological heritage and activity. In contrast to the man-made sequences of siRNAs that target a single gene, microRNA mimics function like naturally occurring microRNAs to orchestrate the expression of many different genes to enable normal cell development and function. Because microRNA mimics have the same functions as the miRNAs that are naturally produced in cells, we believe that they will be unlikely to suffer from the undesired, or so-called "off-target," side effects that are common with siRNAs and other oligonucleotide-based therapies.

We have benefited from the recent expansion of oligonucleotide therapeutic development programs which have produced improved systemic oligonucleotide delivery technologies. We employed a comprehensive evaluation of more than 10 of the most compelling preclinical or clinical stage lipid- and polymer-based nanoparticle delivery technologies to select an innovative liposomal technology called SMARTICLES to enable the systemic delivery of our microRNA mimics to cancer cells in patients.

Our early research and discovery work originated in 2002 at Ambion, Inc. and formed the initial basis for our patent portfolio, and later continued at our former parent company, Asuragen, Inc. This pioneering work allowed us to develop deep know-how and expertise in the science underlying microRNAs and to develop a strong intellectual property position, which we continue to expand and strengthen. While our primary focus has been on the discovery and development of microRNA-based therapies for cancer, our scientists have also discovered functions of microRNAs in numerous diseases other than cancer, which may provide us an opportunity to expand this novel technology into other therapeutic areas of unmet medical need. We believe these microRNAs represent future partnering or diversification opportunities.

microRNAs: A Unique Class in the RNA Therapeutics Space

The landscape of RNA-based therapeutic technologies has rapidly expanded over the past few years, mostly due to advances in the delivery of these molecules to their intended targets. We are aware of several companies that are working specifically to develop RNA therapeutics, which we believe generally fall into the following categories:



While other companies in the field of microRNA have focused primarily on inhibiting overexpressed microRNAs by antagonists known as anti-miRs or AntagomiRs, we have focused on introducing microRNAs that are under-expressed in disease through the use of microRNA mimics. This is in part due to what we believe is stronger therapeutic activity of microRNA mimics compared to anti-miRs or AntagomiRs. Within the group of companies in the microRNA space, we are the first

company to clinically employ microRNA mimics. The approach, technological and therapeutic focus and status of lead programs for these microRNA companies are as follows:

Company	microRNA Approach	Technology Focus	Therapeutic Focus	Status of Lead Program
Mirna Therapeutics	microRNA mimics	Replacement of tumor suppressor microRNAs	Cancer	MRX34(miR-34 mimic): 1st microRNA mimic in Phase 1
EnGeneIC	microRNA mimics	Replacement of tumor suppressor microRNAs	Cancer	MesomiR-1 (miR-16 mimic) in Phase 1 for mesothelioma
miRagen Therapeutics	anti-miRs	Inhibition of microRNAs	Cancer, amyotrophic lateral sclerosis (ALS), fibrosis, cardiovascular disease	Preclinical
Regulus Therapeutics	anti-miRs	Inhibition of microRNAs	HCV: kidney fibrosis	RG-101 (anti-miR-122) in Phase 1; RG-012 (anti-miR-21) in Phase 1
Roche (Santaris)	anti-miRs	Inhibition of microRNAs	HCV	Miramersen (anti-miR-122) in Phase 2

We believe that microRNA-based therapies have the potential to become a new class of drugs with broad therapeutic application based on the following:

- **microRNAs are misexpressed in a broad range of diseases.** Comparing the microRNA profiles of diseased and normal adjacent tissues from patients with cancer, obesity, cardiovascular diseases, neurodegenerative diseases, viral infections and a variety of other conditions has revealed consistent alterations in the expression of several microRNAs for each disease. Animal model studies have further revealed that the altered expression of many of these microRNAs contributes to the development of the disease.

- **microRNA therapeutics have the potential to modulate multiple disease pathways.** microRNAs are known to regulate gene networks involved in key biological pathways. Because of this unique attribute, the use of microRNA therapeutics may allow for more effective treatment of complex, multi-factorial diseases, such as cancer, in which multiple disease pathways are affected.

- **Target specificity minimizes off-target effects.** We believe our microRNA mimics regulate the same genes that are regulated by normally-expressed, naturally occurring microRNAs. Because normal cells have high levels of tumor suppressor microRNAs, the human genome has evolved to prevent the microRNAs from regulating the expression of non-target genes. This substantially reduces the likelihood that a microRNA mimic of the same tumor suppressor microRNA will affect the expression of any genes other than those that are targets for the naturally occurring tumor suppressor microRNA. We believe this is a key advantage of microRNA mimics over other targeted oligonucleotide-based therapies, such as antisense and siRNAs.

- **Synergies with other therapies.** In certain complex therapeutic areas, such as cancer, physicians typically treat patients with combination therapies and we believe microRNA-based replacement therapy has the potential to become part of that treatment paradigm. Nonclinical data suggest that microRNA therapeutics and different therapeutic modalities, such as radiation therapy, targeted therapies or, potentially also immuno-oncology agents may work synergistically to treat cancer.

The Current Challenges in Cancer and Cancer Therapies

Over the past two decades, cancer drug development has moved from systemic cytotoxic chemotherapy to more targeted therapies, with approximately 1,000 targets discovered and close to 800 drugs in development aimed at specific targets. First-generation targeted therapies have generally produced lower levels of toxicity than systemic cytotoxic therapies with variable efficacy outcomes. Efforts at improving the efficacy of cancer drug targeting have focused on defining subgroups of

patients who are most likely to benefit from targeted therapies with the aid of modern molecular diagnostics, on combinations of targeted therapies with complementary mechanisms of action and on combinations of targeted therapies with chemotherapy or biological agents. Harnessing the patients' own immune system to attack cancer has had a long history of disappointments in the past, even though a small percentage of patients have apparently received long-term benefit in tumor control and overall survival. The recent discoveries of checkpoint inhibitors and other immuno-oncology products have resulted in marked improvements in efficacy, especially in long-term tumor control and overall survival. Several immuno-oncology products have been approved for marketing, including ipilimumab (Yervoy®), pembrolizumab (Keytruda®) and nivolumab (Opdivo®). However, only a subset of patients achieve responses to these products when used as a single agent and the development of combinations of these agents has been limited by toxicities.

For the next wave of targeted cancer therapies to produce a measurable improvement over current approaches, we believe it will need to yield drugs that can disrupt multiple oncogenic as well as immuno-oncology pathways. We believe the field of microRNA represents a highly promising area for the development of new cancer agents that can appropriately modulate combinations of oncogenic targets within cancer cells and stimulate patients' own immune system to attack cancer.

By replacing under-expressed tumor suppressor microRNAs to sufficient levels predictably and tolerably, we believe we have the potential to transform the current disease treatment paradigm across a wide variety of cancers provided that the delivery of microRNAs is achieved at sufficient levels. We also believe our microRNA mimics have the mechanistic flexibility to be used as:

- first-line agents in combination with current standards of care, including targeted therapies, immuno-oncology therapies, chemotherapies and/or radiation therapies;
- monotherapies in advanced or refractory patient settings;
- monotherapies in patients who would be intolerant of current standards of care; and
- monotherapies in tumor settings that do not have any approved therapies.

Our Strategy

Our corporate strategy includes the following:

- **Advance our lead product candidate, MRX34, through clinical development.** We are the first to establish clinical proof-of-concept for a microRNA-based replacement therapy for cancer. Our lead microRNA mimic product candidate, MRX34, is the potential first in a new class of promising cancer drugs, and has shown evidence of anti-tumor activity in a patient with metastasized hepatocellular carcinoma and a patient with advanced melanoma in our ongoing Phase 1 clinical trial. Once the dose-escalation phase in the ongoing Phase 1 trial has been completed, we intend to enroll additional patients across various tumor-specific expansion cohorts, including primary liver cancer, melanoma, small cell and non-small cell lung cancer, lymphoma and multiple myeloma. We expect to complete these expansion cohorts and have multiple study data read-outs by the end of 2016. After consultation with the FDA on study results and the recommended clinical development program going forward, we intend to initiate a Phase 2 clinical trial program in early 2017.
- **Identify biomarkers to support therapeutic product candidates.** We believe that biomarkers may be used to monitor microRNA activity and potentially aid in the selection of optimal patient segments in clinical trials. We are using clinical samples supplemented with cell and animal model studies to identify predictive biomarkers that may assist in both demonstrating delivery into and biological activity of miRNA mimics in patient cells, and in selecting patients most likely to benefit from treatment with MRX34 or other product candidates.

- **Expand our clinical development program to additional microRNAs.** Our scientists discovered tumor suppressor microRNAs critical for controlling various cancer processes, which has allowed us to build a broad pipeline of tumor suppressor microRNA mimics that we believe to be promising therapeutic product candidates. Developing one or more product candidates in addition to MRX34, either alone or in combination, will allow us to file additional Investigational New Drug, or IND, applications with the FDA or equivalent applications with foreign regulatory agencies, and will also allow us to expand our clinical development program and create new development, commercialization and out-licensing opportunities. We aim to initiate clinical testing of a second product candidate in 2016.

- **Expand our intellectual property position.** We intend to continue building on our technology platform, comprised of intellectual property, proprietary methods and know-how in the field of microRNA and also to successfully expand and defend our position as a leader in the field of microRNA. We are pursuing or have been granted therapeutic use patent claims related to several tumor suppressor microRNAs, as well as composition of matter claims for multiple chemistries and structures that are, or may be used in or are contemplated for use with, our therapeutic microRNA mimics, including miR-34. We have an exclusive license to the patent estate covering the SMARTICLES liposomal delivery technology for four of our product pipeline candidates, including miR-34, which could be broadened to include certain other tumor suppressor microRNAs. We believe our strong intellectual property position can be used to support internal development as well as out-licensing opportunities.

- **Leverage partnership opportunities.** The recent successful human application of different RNA therapeutic approaches in early clinical trials has led to increased interest in the field of RNA therapy from large pharmaceutical and biotechnology companies. To date, we have focused on establishing proof-of-concept for MRX34; however, in the future we anticipate that we will explore certain partnership opportunities. These may potentially focus on certain ex-U.S. territories where we do not expect to establish a commercial presence. We may also pursue partnerships to expand our development program for MRX34 in combination with approved or development-stage targeted therapies or immune therapies. In these cases, we anticipate retaining or sharing U.S. commercialization rights. As we progress additional product candidates toward clinical development, we may pursue partnerships for these programs in certain cancer types. We believe our leading position in the clinical development of microRNA-based therapeutics in cancer, coupled with a broad and promising pipeline, positions us well to actively seek such opportunities. Additionally, we have identified microRNAs we believe could have potential therapeutic uses for diseases other than cancer, including in cardiovascular, neurodegenerative and inflammatory diseases and a variety of other conditions. We may seek to partner these potential programs while cancer remains our focus.

Our Approach

microRNA Biology

RNA plays an essential role in the process used by cells to encode and translate genetic information from DNA to proteins. RNA is comprised of subunits called nucleotides and is synthesized from a DNA template by a process known as transcription. Transcription generates different types of RNA, including messenger RNAs that carry the information for proteins in the sequence of their nucleotides. In contrast, microRNAs are short RNAs, or oligonucleotides, that do not code for proteins, but rather ensure that the over 20,000 human protein-encoding genes are produced in the proper cells and at the proper levels by coordinating the production of proteins from messenger RNAs that are produced in each cell. microRNA-encoding genes emerged several hundred million years ago and their presence is believed to be a driving factor in the emergence and diversity of vertebrates in

the ecosystem. Without microRNAs, cells and tissues within humans and other vertebrates would not be able to develop or function properly or respond to changes in the internal or external environments.

In humans, each microRNA binds to and regulates the translation of up to several hundred target messenger RNAs. Coordinating the translation of multiple, related genes allows a microRNA to regulate gene networks involved in key biological pathways. Given the importance of microRNAs in coordinating gene expression, it is not surprising that the altered expression of even a single microRNA appears to contribute to a variety of human diseases, including cancer. More than 10 years ago, while working at Ambion, our scientists discovered through extensive microRNA expression and functional assay work that microRNAs are differently expressed in cancer tissue compared to normal adjacent tissue and that several naturally occurring microRNAs function as tumor suppressors by regulating the expression of key oncogenes and preventing the development, progression and dissemination of cancer.

To enable therapeutic application of these tumor suppressor microRNAs, we pioneered technologies for creating RNA molecules that function as natural microRNAs when they enter human cells. These RNA molecules, which we call microRNA mimics, may be used to replace those tumor suppressor microRNAs that are lost, or under-expressed, in cancer cells. We have designed a proprietary, double-stranded microRNA mimic construct for our therapeutic product candidates. The structure of the microRNA mimics we use features two complementary RNA molecules that form a small double-stranded RNA molecule with no overhangs. One strand, the active strand, is an exact copy of the naturally occurring microRNA sequence. The passenger strand is a complement to the active strand with modifications that prevent it from being active in the cytoplasm of the cancer cell, where microRNAs exhibit their cellular function. We have issued patents and pending patent applications on this design, regardless of therapeutic indications, as well as other intellectual property on multiple specific chemistries and structures that may be used in therapeutic microRNA mimics.

Delivery of microRNA Mimics to Target Tissues

Systemic delivery of oligonucleotides, including microRNAs, has been a major challenge, principally due to the fact that these molecules have to overcome multiple barriers after intravenous administration before reaching their ultimate place of action, which is the RNA-induced silencing complex (RISC) in the cytoplasm of cancer cells. Significant hurdles must be overcome at each step:

- binding to plasma proteins and degradation by nucleases in blood;
- excretion through glomerular filtration in the kidney;
- ability to penetrate into the tumor itself; and
- uptake by individual tumor cells and release into cytoplasm.

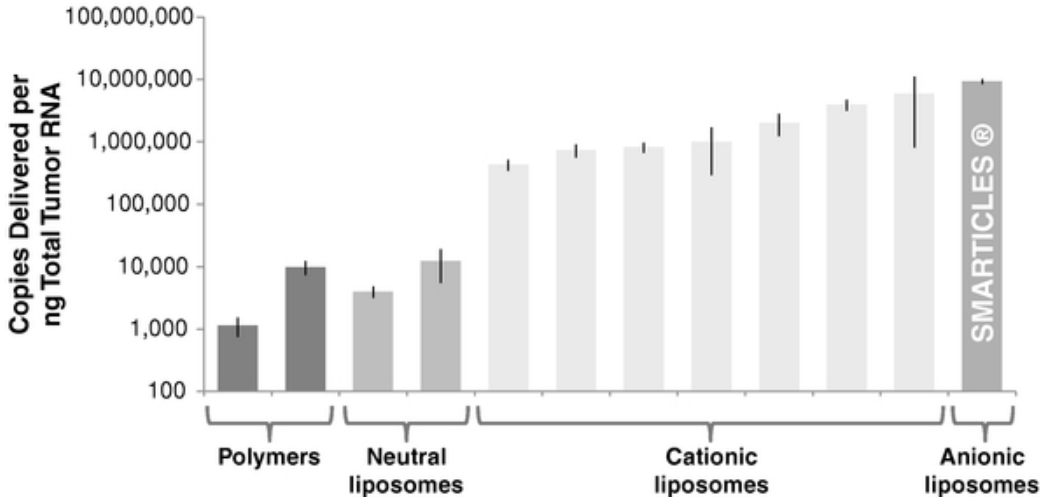
Encapsulation of these oligonucleotides inside delivery nanoparticles overcomes several of these hurdles, and we believe there has been significant progress over the past decade in the design and implementation of novel delivery technologies. Due to the importance of delivery to the success of our product candidates, we have closely monitored progress over the last several years, and will continue to do so going forward. As a result, our team is very focused on, and has become very efficient in, assessing and evaluating new and existing technologies for delivery of our microRNA mimics.

We carried out systematic evaluations of these different proprietary delivery systems under material transfer agreements in conjunction with our microRNA mimics, thereby providing us with formulations of our microRNA compounds for *in vivo* and *ex vivo* testing.

We determined that the SMARTICLES formulation technology, owned by Marina Biotech, Inc., or Marina, had a favorable combination of efficient systemic delivery of miR-34 mimics to solid tumors in mice, a high therapeutic activity of formulated miR-34 in mouse models of cancer, low or no toxicity, and low or no cytokine stimulation in both animal models and an ex vivo human whole blood assay.

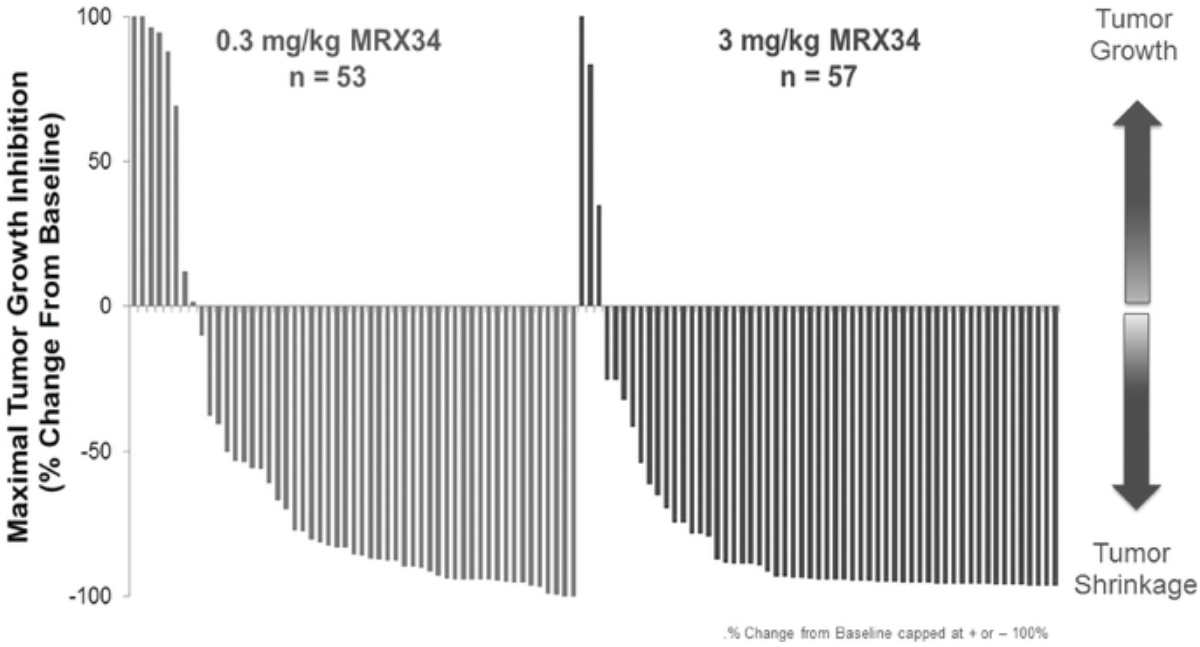
Efficient Systemic Delivery

The SMARTICLES formulation demonstrated key benefits in preclinical studies, including the ability to deliver very high numbers of microRNA mimics to tumors, as shown below.



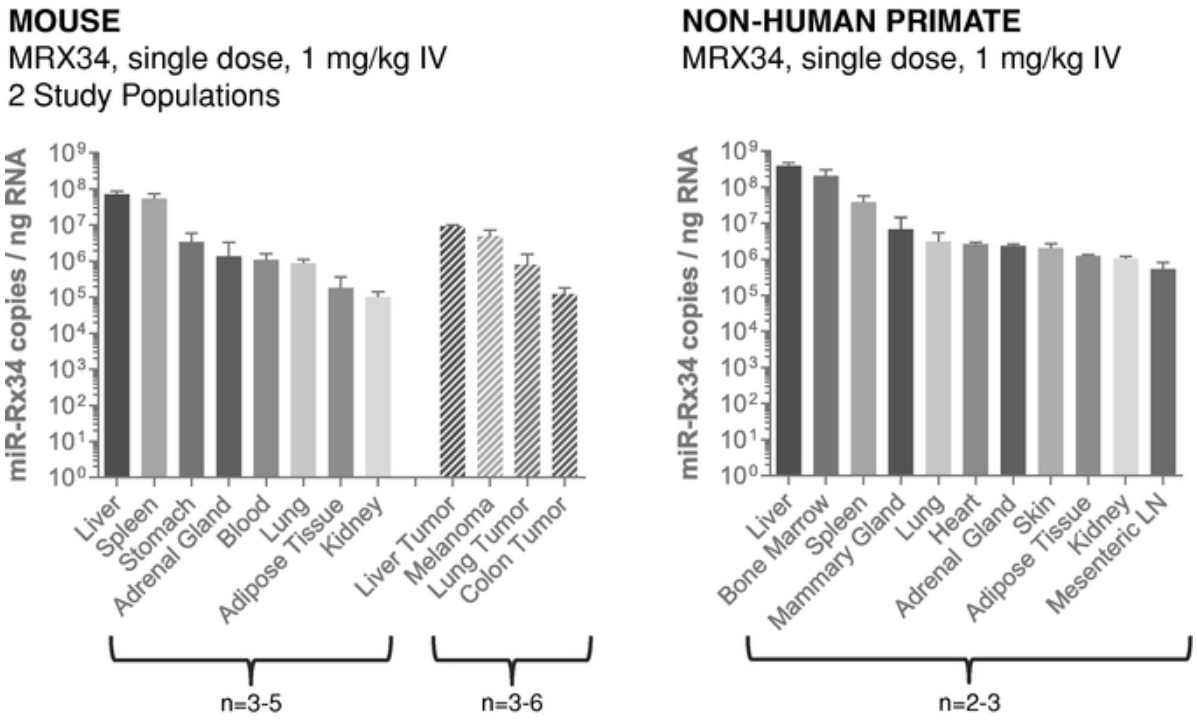
High Therapeutic Efficacy in Mouse Models of Cancer

We observed dramatic efficacy using the SMARTICLES formulation in multiple orthotopic tumor models of liver cancer, including Hep3B, HuH-7, C3A, BN118, and BN124 with full regression in the majority of established liver tumors at different dose levels and with different treatment schedules (see results of mice studies in figure below).



Promising Biodistribution

In addition, the SMARTICLES formulation offers a promising biodistribution pattern after intravenous administration in mice and non-human primates, with delivery of high copy numbers not only to the liver and spleen generally, which is to be expected with liposomal formulations, but also to other highly vascularized tissues, such as lung, adrenal gland, stomach and kidney, and also to bone marrow in non-human primates. As shown in the following figures, the SMARTICLES formulation was found to deliver to both healthy and cancerous cells, with a high number of copies of the miR-34 mimic delivered to tumors located in the liver, lymph nodes (melanoma metastases), lung and colon, as well as to highly vascularized tissues, including adrenal gland and kidney.



This pattern of biodistribution upon intravenous administration is also well documented for other liposomal formulations, with highest levels of delivery to the liver and spleen.

Lack of Cytokine Stimulation

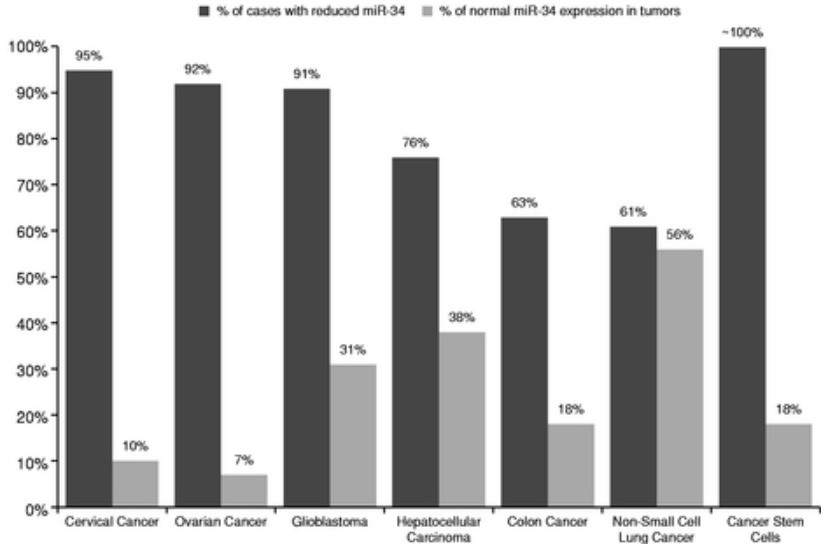
The SMARTICLES formulation includes negatively charged liposomes, which we believe might limit the toxicities that have plagued positively charged liposomal formulations that have been used for other oligonucleotide-based therapies. There have been no statistically significant elevations in the cytokine levels of mice and non-human primates dosed with SMARTICLES-formulated microRNA mimics, or in a human whole blood assay of key human cytokines, indicative of a potentially induced immune response. No significant changes in the serum levels of cytokines, such as interferon-a, TNF-a, IL-1 and IL-12 have been observed. Variable dose-related increases in IL-6 were seen, but these increases were not statistically significant as compared to the control group and were not of a magnitude that we believe would cause clinical concern.

Exclusive License

In December 2011, we obtained an exclusive license from Marina under its rights to the SMARTICLES technology. Our license from Marina grants us exclusive rights (including the right to sublicense) under the SMARTICLES technology to develop, manufacture and commercialize products containing miR-34, and, pursuant to a December 2013 amendment, three other promising tumor suppressor microRNA targets selected by us. Although we remain confident in our selection of SMARTICLES for our lead therapeutic candidate, we are continuing to evaluate different delivery technologies for potential use in conjunction with miR-34 and the other microRNA mimics in our pipeline for the purposes of optimizing delivery of our drug candidates to a broader group of tissues and organs.

Selection of miR-34 as Lead Therapeutic Target

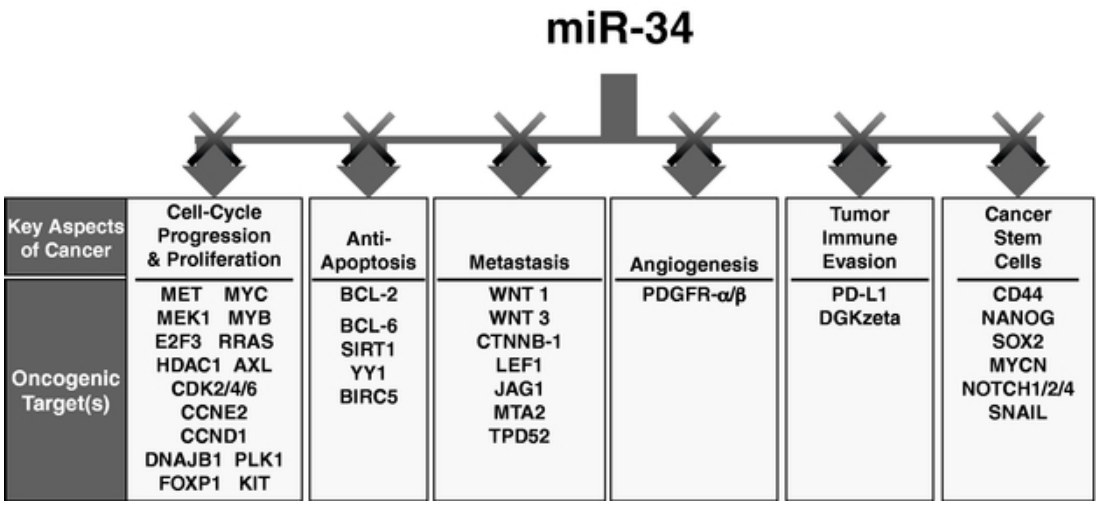
miR-34 is one of the most widely published tumor suppressor microRNAs. Studies have revealed that the levels of miR-34 are reduced in the tumors of patients with a wide variety of cancers, as exemplified in the graph below.



The under-expression of miR-34 in cancers appears to be due to the fact that miR-34 expression is affected by p53, a well-known tumor suppressor that is often mutated and less active in tumors. Published data suggest that miR-34 functions akin to the tumor suppressor function of p53, controlling many genes and pathways that are also associated with p53. Reduced expression of miR-34 in cancers also commonly occurs as a result of methylation of the miR-34 gene.

Based on published reports from microRNA scientists at numerous research institutions, miR-34 plays a key role in controlling the expression of more than 30 oncogenes as well as genes involved in

tumor immune evasion, as shown in the figure below. This includes targets that are the focus of currently-marketed and investigational cancer drugs.



The considerable reduction of miR-34 levels observed in cancer stem cells suggests that the microRNA might play a functional role in preventing normal cells from acquiring stem-like properties, like cell self-renewal, which can contribute to the development of cancer. In partnership with an academic collaborator, we successfully demonstrated that introducing miR-34 into prostate cancer stem cell populations can significantly reduce their stem-like properties and limit their capacity to form tumors. Similar results have been obtained from studies using pancreatic and gastric cancer stem cells. We believe the ability of miR-34 to inhibit cancer stem cells has significant implications for cancer therapy since the cancer stem cells present in tumors are thought to be the primary drivers of tumor growth, metastasis and resistance to therapy.

Recent data generated with an academic collaborator showed that miR-34 directly represses the checkpoint signaling molecule PD-L1. PD-L1 protein present on tumor and immune cells can silence anti-tumor immune responses and has become a promising drug target in immuno-oncology therapies. The introduction of miR-34 mimics into cultured lung cancer cells led to a remarkable decline of PD-L1 protein expression. In a syngeneic mouse model of lung cancer, we successfully demonstrated that MRX34 treatment led to repression of the PD-L1 protein in tumor tissue and an increase in active tumor-infiltrating immune cells (CD8+) and a decrease in so-called exhausted tumor-infiltrating immune cells (CD8+PD1+). We believe the ability of miR-34 to block PD-L1 signaling may broaden the therapeutic application of MRX34 as a monotherapy as well as in combination with other immune-oncology therapies.

MRX34: Our Lead Product Candidate

MRX34 is a double-stranded RNA mimic of the tumor suppressor microRNA, miR-34, encapsulated in a liposomal nanoparticle formulation called SMARTICLES. miR-34 inhibits multiple oncogenic pathways and stimulates anti-tumor immune response to induce cancer cell death. We performed cell culture studies that revealed that introducing a mimic of miR-34 into cancer cell lines derived from patients with liver, lung, colon, pancreatic and breast cancers results in significant reductions in cell proliferation. In various preclinical studies, miR-34 also inhibited formation of cancer stem cells, which are believed to contribute to the development, metastasis and therapeutic resistance of tumors. Studies performed at other laboratories have indicated that increasing miR-34 levels also inhibit the proliferation of cancer cells derived from patients with malignant melanoma, B-cell lymphoma and multiple myeloma.

MRX34 Clinical Development Program

In addition to evaluating the safety, tolerability and pharmacokinetic profile of MRX34, an important goal of our ongoing Phase 1 clinical trial is to establish proof of concept of microRNA replacement therapy in patients with primary liver cancer or advanced solid tumors. Our focus on hepatocellular carcinoma, or HCC, is based on the fact that liposomal nanoparticle formulations have a tendency to deliver their payload to the liver, and the high unmet medical need in this tumor type. For example, sorafenib (Nexavar), the only approved drug for unresectable primary liver cancer, has only shown a 2% objective response rate. Additionally, we have also demonstrated meaningful results with MRX34 in multiple mouse models of primary liver cancer, including a study in which MRX34 demonstrated improved survival over sorafenib. To date we have observed tumor shrinkage greater than 30% in two patients with Stage IV cancer: one patient with a confirmed partial response in primary liver cancer metastasized to the lung; and a confirmed partial response in a melanoma patient with disseminated disease.

The Investigational New Drug application was initially filed with the FDA on February 27, 2013 and we received the notification from the FDA to proceed with the Phase 1 clinical trial on March 29, 2013. During the course of our Phase 1 clinical trial, the protocol was amended and the patient population was expanded to also include patients with hematological malignancies, based on the observation that specific lymphomas and leukemias are characterized by low levels of miR-34 and biodistribution data that support high delivery to bone marrow and malignant lymphocytes. During the trial, we have observed dose-dependent MRX34 delivery and activity in normal white blood cells of patients and we aim to demonstrate delivery to tumors when patient biopsies become available during our expansion cohorts.

The primary objectives of the multicenter Phase 1 clinical trial of MRX34, including the hematological malignancy cohort, are to establish the maximum tolerated dose and an appropriate dose for Phase 2 clinical trials. The secondary objectives of the Phase 1 clinical trial are to assess the safety, tolerability and pharmacokinetic profile of MRX34 after intravenous dosing as well as to assess any biological and clinical activity. This Phase 1 clinical trial is not designed to show statistical significance of the study endpoints.

According to the original protocol, MRX34 was administered as a single agent intravenously twice a week, or BIW, for three weeks with one week off, in 28-day cycles, until disease progression or intolerance. This dosing schedule was selected based on preclinical toxicity and efficacy studies. In total, 47 patients have been treated on BIW dosing schedule and a Maximum Tolerated Dose (MTD) was established at 110 mg/m^2 for this dosing schedule. Based on our experience with this dosing schedule and another company's experience with a SMARTICLES-based liposomal formulation, the protocol was subsequently amended to introduce a second dosing schedule in mid-2014, which involves daily MRX34 administration for five days, or QD × 5, with two weeks off, in three week cycles. To date, 54 patients have been treated on the QD × 5 dosing schedule, and recruitment is continuing. In the 47 patients treated on the BIW dosing schedule, 38 patients were evaluable for response, based on availability of baseline and follow-up scans or disease progression as determined by the study investigator. In those 38 patients, six patients showed stable disease varying between two and eight cycles in length, and at different dose levels. Of the 54 patients enrolled to date on the QD × 5 dosing schedule, 44 are evaluable for response. Eleven of the 44 patients have shown stable disease of varying duration, between two and 16 cycles of treatment, and at various dose levels.

The Phase 1 clinical trial consists of an initial dose-escalation phase, followed by an expansion phase after a maximum tolerated dose and recommended Phase 2 doses are identified. In the expansion phase, patients being treated at the recommended Phase 2 dose may undergo tumor biopsies to identify potential biomarkers for assessing delivery and activity of miR-34, and/or predicting response to MRX34.

Through the first 28 months of our Phase 1 clinical trial, 101 patients have been treated with escalating doses of MRX34 in either BIW or QD × 5 schedules, starting at the 10 mg/m^2 BIW dose level. Nearly all patients experienced at least one adverse event, with fever, chills, back pain, abdominal pain, nausea, diarrhea, vomiting, dehydration, anorexia, dyspnea, fatigue, headache, cough, insomnia, dysgeusia, tachycardia, anemia, neutropenia, lymphopenia, leukopenia, thrombocytopenia, elevation of liver enzymes, hyperglycemia and hyponatremia being the most commonly reported adverse events.

During the study, one treatment-related death occurred in a 77-year old patient with kidney cancer metastized to the lungs, whose cancer had worsened during previous sequential treatments with sunitinib, everolimus, axitinib, bevacizumab, and AMG172. After the second dose of MRX34 on the QD × 5 schedule, the patient developed hypoxemia, a deficiency in oxygen saturation in the blood. Computed tomography scanning showed worsening of the cancer in lungs as well as possible colitis, an inflammation of the colon. The patient and family elected Do Not Resuscitate status and the patient died two days later. We believe that the patient experienced immune-mediated pneumonitis and colitis, which have been observed with other immuno-oncology drugs and are included in FDA-approved drug labels.

The treatment-related serious adverse events occurring in more than one patient were as follows:

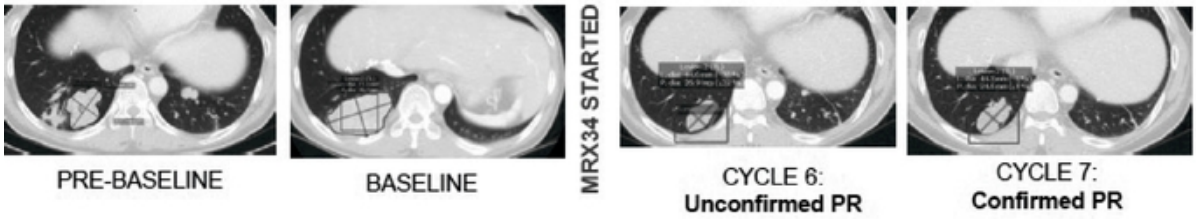
- Among the 47 patients in the BIW dosing cohort, the serious adverse events determined to be related to MRX34 treatment and occurring in more than one patient were fever, fatigue, dehydration and elevation of liver enzymes, each of which occurred in two patients to date. For the BIW schedule, the MTD of MRX34 was found to be 110 mg/m^2 among patients with advanced solid tumors with liver involvement.

- For the 54 patients in the QD × 5 dosing cohort, the serious adverse events determined to be related to MRX34 treatment and occurring in more than one patient, were fever, bleeding in silent or asymptomatic HCC brain metastasis, and elevation of liver enzymes, each of which occurred in two patients to date, and thrombocytopenia, which occurred in three patients to date. The MTD has not been determined for the QD × 5 schedule among patients with hematological malignancies or solid tumors and MRX34 dose escalation is continuing with additional patients being enrolled into the study. Current dose levels are 70 mg/m^2 for primary liver cancer patients, 93 mg/m^2 for other solid tumors and 110 mg/m^2 for hematological malignancies.

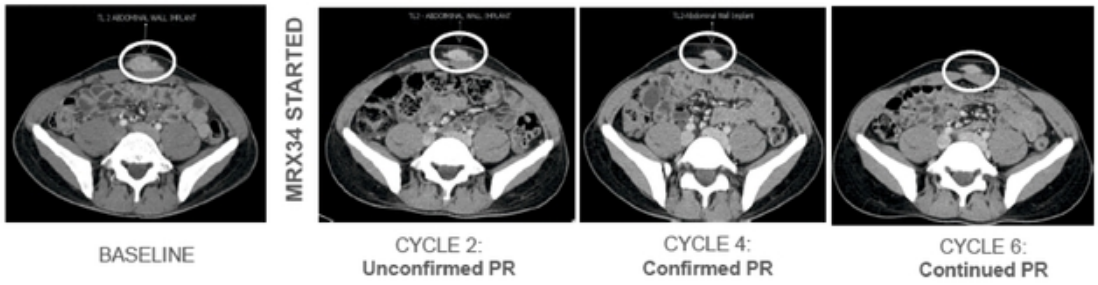
Many of the most common adverse events associated with MRX34 are similar to those reported with other liposomal drug formulations, including amongst others, fever, chills, back pain, abdominal pain, nausea, diarrhea, vomiting, dehydration, anorexia, dyspnea and fatigue and are generally manageable or preventable with standard interventions or tests used by oncologists, such as administering other medications that prevent or reduce side effects, temporary slowing of infusions, delaying or stopping dosing, or using magnetic resonance imaging, or MRI, to detect silent brain metastases.

Of the 32 patients with primary liver cancer treated with escalating doses of MRX34 to date, one advanced HCC patient with underlying HBV etiology and metastases to the lungs enrolled into the 70 mg/m^2 dose cohort on the BIW schedule achieved a confirmed partial response after treatment cycle 6. Below are the CT scans showing growth of the primary liver cancer metastasis in the lung from pre-baseline to baseline, prior to enrollment in the study. After initiating MRX34, the tumor showed

shrinkage after six cycles of treatment, continuing in cycle seven. This patient is one of the 12 patients with primary liver cancer enrolled from the Korean sites.



The one melanoma patient enrolled in the study to date, enrolled into the 110 mg/m^2 dose cohort on the QD × 5 schedule, achieved a confirmed partial response, per independent radiology review using RECIST criteria, after four cycles of MRX34 treatment.



In the 47 patients treated on the BIW dosing schedule, 38 patients were evaluable for response, based on availability of baseline and follow-up scans or disease progression as determined by the study investigator. In those 38 patients, six patients showed stable disease varying between two and eight cycles in length, and at different dose levels. Of the 50 patients enrolled to date on the QD X 5 dosing schedule, 44 are evaluable for response. Eleven of the 44 patients have shown stable disease of varying duration, between two and 16 cycles of treatment, and at various dose levels.

Following the determination of the maximum tolerated dose and an appropriate dose for Phase 2 clinical trials with QD × 5 schedule, we plan to enroll approximately 100 patients into the Phase 1b expansion cohorts. The expansion cohorts are expected to enroll patients with HCC, melanoma, SCLC, NSCLC or hematological malignancies, with enrollment expected to be completed by end of 2016. Based on the safety and efficacy data from the expansion cohorts, we plan to meet with FDA to discuss the next phase of the MRX34 clinical development.

Pharmacokinetics and Pharmacodynamics

Both maximum blood concentrations (Cmax) of, and drug exposure (area under the curve, or AUC) to, miR-34 showed a non-linear, non-dose proportional increase with increasing doses in both the BIW and QD × 5 schedules. In the BIW schedule, the AUC after the sixth dose (cycle day 18) was generally similar compared to the AUC after the first dose (cycle day 1). With the QD × 5 schedule, the AUC was increased approximately 10-fold on fifth day of dosing (cycle day 5) as compared after the first dose (cycle day 1). The increased drug levels on cycle day 5 may provide higher exposure of different tissues, including tumor cells, to MRX34. We believe that the higher exposure with 5 days of consecutive daily dosing is a benefit of the QD × 5 schedule as compared to the BIW schedule.

To address whether the miR-34 mimic administered as MRX34 can engage its molecular targets in patients, we have collected and continue to collect various human tissues for molecular analysis. To date, we have biomarker data from human white blood cells (hWBCs) from patients treated with MRX34 in our ongoing Phase 1 clinical trial, and intend to collect data from patient tumor biopsy material during the dose expansion phase of the trial. We have collected hWBCs during cycle 1 just before initiation of treatment (pre-dose) and at multiple time points thereafter. Samples from 21 patients dosed QD × 5 at dose levels ranging from 33 - 110 mg/m^2 were submitted to gene-specific quantitative PCR analysis, and samples from ten patients dosed QD × 5 at 33 - 93 mg/m^2 were analyzed via whole transciptome Next Generation Sequencing (NGS). Both sets of data show a dose-dependent repression of numerous oncogenes that have previously been identified as direct miR-34 targets, including FOXP1, BCL2, HDAC1 and CTNNB1. In contrast, it has been reported that hWBC samples revealed a dose-dependent up-regulation of p21-CIP1/WAF1, a tumor suppressor gene specifically induced by miR-34. Based on these data, we believe that the systemic administration of MRX34 to patients with different cancer types facilitated successful delivery of miR-34 into white blood cells and direct engagement of several biological targets of the miRNA. During the expansion phase of the Phase 1 trial, we intend to collect tumor specimens for use in similar pharmacodynamics assessments, and hope to correlate those with clinical responses in patients treated with MRX34.

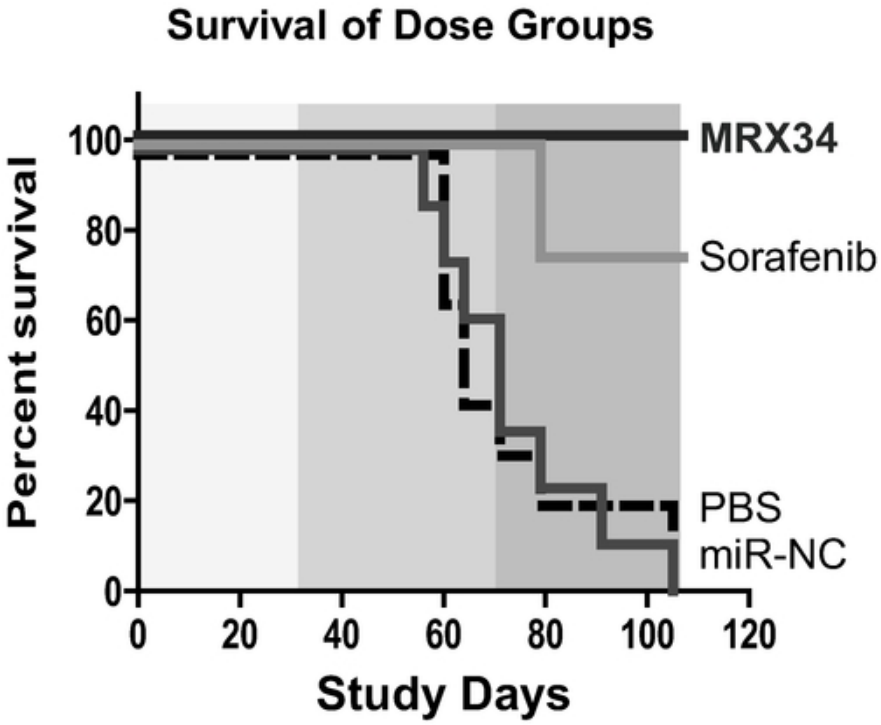
MRX34 Preclinical Development Program

Monotherapy

We utilized two different models of liver cancer in mice to develop and characterize MRX34. These preclinical studies revealed that intravenous injections of MRX34 caused a greater than 100-fold increase in miR-34 levels in liver tumor cells and a corresponding reduction in the expression of oncogenes that are targets for the natural miR-34. Efficacy studies have revealed that intravenous injections of MRX34 three times per week at doses as low as 0.1 mg/kg and dosing as infrequent as once per week at 3.0 mg/kg can cause mature human primary liver tumors in mice to regress.

We compared the therapeutic activity of MRX34 to sorafenib (Nexavar), which is the current standard of care for patients with HCC, in a 16-week orthotopic human liver cancer mouse model. After the human liver tumors were developed in livers of mice over the first four weeks of the study, the mice were dosed for six weeks followed by an additional six weeks of off-treatment monitoring for health and liver tumor growth. We dosed the mice by tail vein injection every other day with MRX34 at a rate of 0.3 mg/kg or by oral daily dosing with sorafenib at a rate of 30 mg/kg. As control groups for our study, we used a phosphate buffered saline buffer as well as a scrambled microRNA sequence formulated in the SMARTICLES delivery formulation, or miR-NC. Each of the two control groups were dosed by the same route and on the same dosing schedule as MRX34. During the six-week dosing period, as well as during the six-week period after the final dose, we measured the weights of the mice biweekly and conducted health checks twice daily. As shown in the following graph, due to the aggressive nature of these tumors, none of the mice in either of the control groups survived the full duration of the study, as we observed large tumors in each of the mice. By comparison, two of the mice from the sorafenib group did not survive the full duration of the study, while all of the mice from the MRX34 group survived. Following the study, tumors were detected in three of the mice from the sorafenib group, while no tumors were detected in any of the eight mice comprising the MRX34 dosing group. We concluded from the study that the systemic delivery of MRX34 not only led to full regression in the majority of established liver tumors, but also had eliminated the potentially remaining

viable liver cancer cells in the mice, with no tumor recurrence during the off-treatment follow-up period.

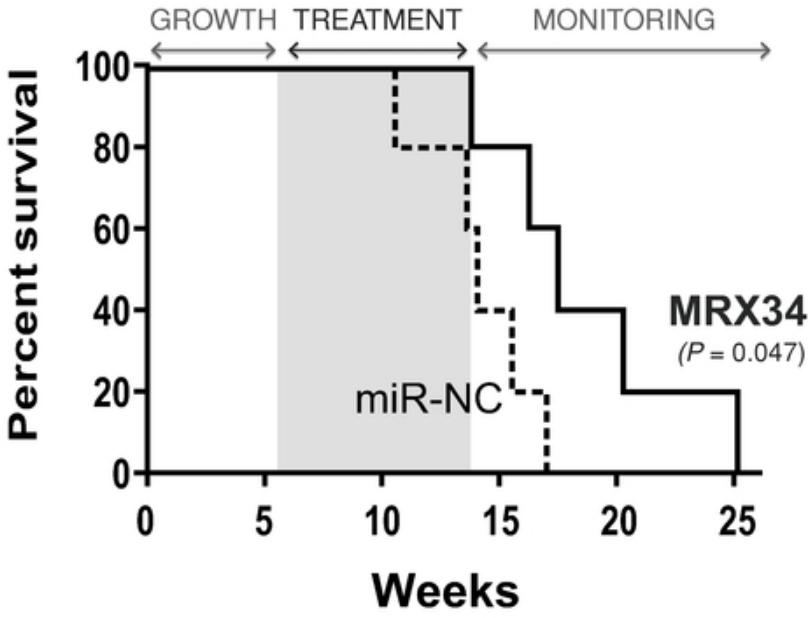


We believe that the potency exhibited by MRX34 in the liver cancer efficacy studies is derived from the ability of the small microRNA to regulate multiple genes and pathways that are important for HCC development and growth.

Delivery to Tumors Outside of the Liver

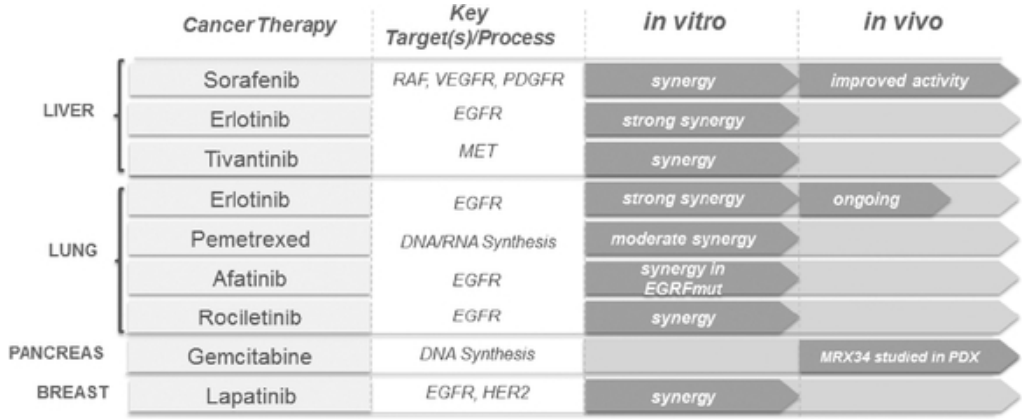
In collaboration with Yale, we evaluated the therapeutic effects of MRX34 in the $KRAS^{LSL\text{-}G12D}/TP53^{fl/fl}$ genetically engineered mouse model of NSCLC. Orthotopic lung tumors were initiated by the intratracheal delivery of adenovirus carrying *cre* recombinase, leading to activation of the KRAS mutant and a concomitant loss of p53. Both genetic alterations are common in human lung cancers. Lung lesions typically show an aggressive growth behavior and frequently cause death. Continuous dosing of MRX34 demonstrated a statistically significant prolongation of survival of the tumor-bearing mice relative to mice that were dosed with a SMARTICLES-formulated negative control microRNA

(miR-NC). The results of this study suggest that systemic delivery of MRX34 had a therapeutic effect in orthotopic lung tumors.



Combination Therapy for MRX34

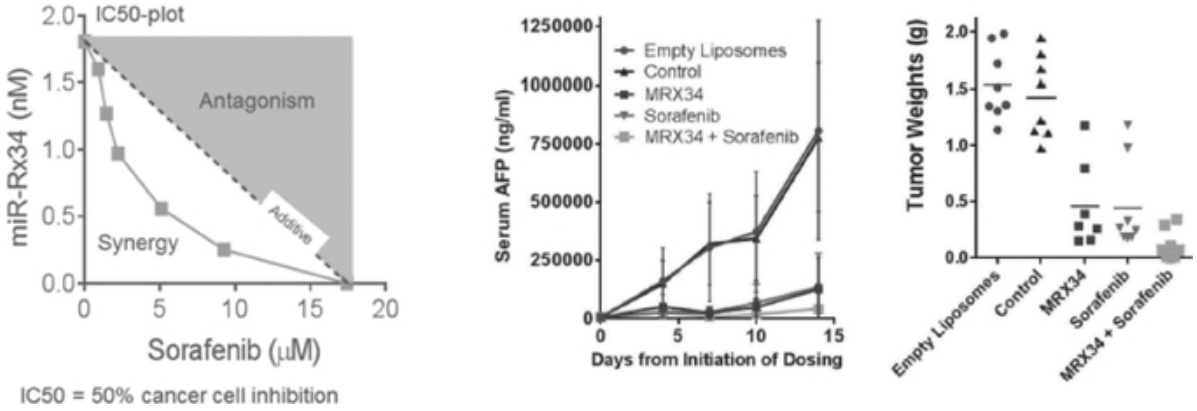
Since most cancer therapeutics are used in combination to increase efficacy while minimizing toxicity, we have initiated a program to evaluate MRX34 in combination with various standard of care and investigational cancer drugs. We chose tumor models and chemotherapeutic agents based on the predicted patient profile in our future expanded clinical development program for MRX34. These included patients with primary liver cancer or advanced lung and pancreatic cancers that have metastasized to the liver.



Hepatocellular Carcinoma (HCC)

Using a panel of four human liver cancer cell lines, our *in vitro* studies have shown that our miR-34 mimic, which is the drug substance of MRX34, cooperates synergistically with sorafenib (Nexavar), which is the standard of care for use in patients with HCC, to inhibit cancer cell

proliferation. When used in combination, both the miR-34 mimic and sorafenib were more effective at lower doses both across cell lines and at various drug ratios. Data in Hep3B cells showed that the dose requirement for sorafenib to induce 50% cancer cell inhibition could be reduced by eight- and 19-fold in the presence of 1 nM and 1.6 nM miR-34 mimics, respectively. The dose requirement for the miR-34 mimic to induce 50% cancer cell inhibition could be reduced by up to seven-fold in the presence of sorafenib. The superior inhibitory activity of the combination demonstrated in these *in vitro* studies was confirmed in an animal study during which mice were treated with the combination or with each of the single agents alone for approximately two weeks. Our data showed that liver tumors from animals treated with the combination were significantly smaller than tumors from animals that received either miR-34 mimic or sorafenib alone.



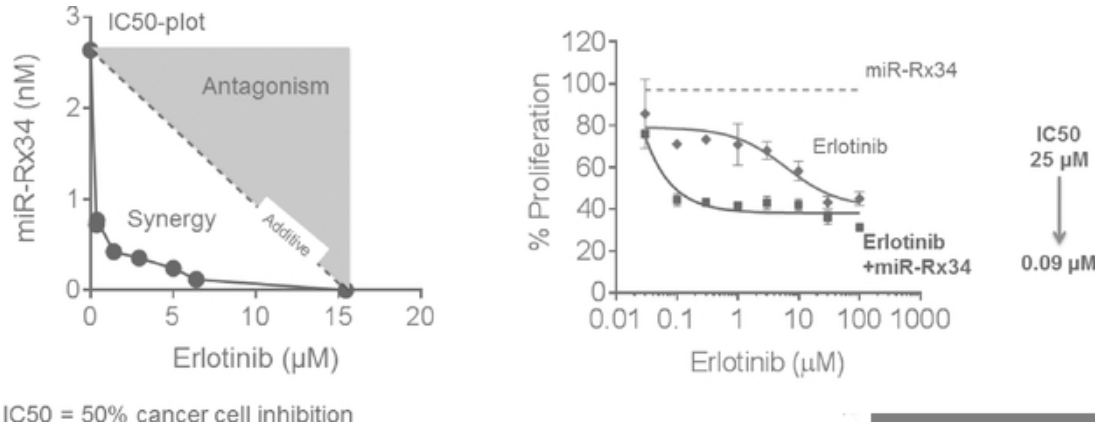
In clinical practice, a combination of MRX34 and sorafenib could potentially be more effective by increasing the potency and/or reducing the toxicity of each individual drug, and thus ultimately, once approved and marketed, potentially increase the lifespan of liver cancer patients and significantly expand the market opportunity for both drugs.

Non-Small Cell Lung Cancer (NSCLC)

Cell culture models of human non-small cell lung cancer have been used to show that combining our miR-34 mimic with erlotinib (Tarceva®), a small molecule inhibiting EGFR (epidermal growth factor receptor) creates a synergistic effect, and thus yields a potent therapy for non-small cell lung cancer in human cell lines that are resistant to erlotinib alone. Synergy was observed in cancer cells with primary erlotinib resistance, such as those that are EGFR wild-type but encode mutated KRAS, as well as cancer cells with acquired (secondary) resistance. The latter involved cancer cells that are EGFR-mutated but overexpress MET and AXL, both of which are oncogenes known to induce erlotinib resistance. In combination with the miR-34 mimic, erlotinib concentrations required to induce 50% cancer cell inhibition could be reduced from 25 μM to 0.09 nM which reflects a concentration required to induce 50% cancer cell inhibition in the parental, erlotinib-sensitive cell line. This application could significantly increase the number of lung cancer patients who could be treated with erlotinib and also further expand the market potential for MRX34. The miR-34 mimic also cooperated

synergistically with 2nd (afatinib) and 3rd (rociletinib) generation EGFR small molecule inhibitors in lung cancer cells, particularly those that harbor an EGFR mutation but are erlotinib-refractory.

Primary Resistance (KRAS-mutated) ***Acquired (Secondary) Resistance*** (Erlotinib-resistant cells; EGFR-mutated, MET & AXL overexpression)



Additionally, synergistic activity was demonstrated with pemetrexed (Alimta®) in lung cancer cells, erlotinib and tivantinib in liver cancer cells, gemcitabine in pancreatic cancer and lapatinib (Tykerb®) in breast cancer cells. Additional *in vivo* testing is in process. Given our recent preclinical data suggesting that MRX34 may also inhibit PD-L1 and tumor immune evasion, we intend to also explore the utility of miR-34 mimics in combination with other immune-oncology therapies.

Combination of Different microRNAs

Because individual tumor suppressor miRNAs modulate the expression of different sets of genes, it is possible to use combinations of miRNAs to extend the number of oncogenes that are being affected. Using a liver cancer model, we observed that co-injecting half-doses of MRX34 and a SMARTICLES-formulated mimic of miR-7 provided greater tumor regression and longer survival than did full dose injections of either MRX34 or SMARTICLES-miR-7 alone. Similar results were produced in collaboration with Dr. Frank Slack while at Yale University, as we showed that combining the tumor suppressor microRNAs miR-34 and let-7 in the same SMARTICLES liposomal delivery formulation leads to superior therapeutic activity in a genetically engineered mouse model of lung cancer. The miR-34 and let-7 combination showed higher level of tumor growth inhibition than either liposomal miR-34 or let-7 alone in this very aggressive lung cancer model. These data suggest that combining tumor suppressor miRNAs might yield a more potent therapeutic candidate, and could represent another product development and commercial opportunity

MRX34 Market Opportunities

Primary Liver Cancer (Hepatocellular Carcinoma)

According to the World Health Organization, or WHO, liver cancer is the third leading cause of cancer deaths worldwide. HCC is the most prevalent form of liver cancer and is the most common cancer in some parts of the world, with more than one million new cases diagnosed each year worldwide according to the National Cancer Institute. According to recent reports from the Centers for Disease Control, HCC rates in the United States are increasing with common risk factors including alcohol consumption, metabolic syndrome, chronic hepatitis B or C infection and Type 2 diabetes. Patients diagnosed with HCC have a poor prognosis, with a very low five-year survival rate of less than

10%. Treatment options include surgical resection, liver transplantation, radiofrequency ablation and chemoembolization, or delivery of a drug mixed with particles through an arterial catheter directly into the tumor's blood supply. The only systemic drug therapy approved for the treatment of unresectable HCC is the drug sorafenib (Nexavar), which provides a 2.8 months median overall survival benefit based on a median overall survival of 10.7 months compared to 7.9 months for a placebo. Nivolumab (Opdivo), a PD-1 (programmed death 1) blocker, has recently shown promising results in HCC with a 19% objective response rate reported in a Phase 1 clinical trial.

Skin Cancer (Melanoma)

An aggressive type of skin cancer, melanoma, can occur anywhere on the body, but is most common in skin that is often exposed to sunlight, such as chest and back in men, legs in women, as well as face, neck, hands, and arms. Melanoma is a disease in which pigmented cells in the skin, called melanocytes, turn into cancer cells. The WHO states that the incidence of melanoma skin cancers has been increasing over the past decades and has reached 132,000 globally each year. Approximately 73,000 cases of melanoma are expected to be diagnosed and 10,000 deaths will occur in the United States alone in 2015, according to the American Cancer Society. The five-year survival rate is currently about 15% to 20% in patients with metastatic melanoma. Approved treatment options for melanoma include surgery, chemotherapy, radiation therapy, biologic therapy and targeted therapies. In recent years, significant advances have been achieved in the treatment of melanoma by targeting PD-1, a protein expressed on the cellular surface of immune cells called T cells that normally function to keep these cells from attacking other cells in the body. The PD-1 signal is induced by PD-L1, which is expressed by a variety of normal cells. PD-L1 can also be expressed by various tumor cells, including melanoma, and consequently leads to tumor immune evasion. Drugs that block PD-1 boost the immune response against melanoma cells, which can often lead to tumor shrinkage and increased patient survival. Pembrolizumab (Keytruda) and nivolumab (Opdivo) are FDA-approved drugs that target PD-1. Ipilimumab (Yervoy) also boosts immune response but blocks CTLA-4, another T cell protein. Clinical trials have recently shown these drugs to be highly effective, but package inserts indicate that these drugs are effective against less than approximately 25% of patients. Recent preclinical data have shown that miR-34 also activates the immune system by repressing PD-L1. Our development plan includes continuing to study MRX34 as a monotherapy in melanoma and in combination with approved checkpoint inhibitors to determine whether MRX34 may be able to increase the numbers of patients who respond to these therapies or minimize or reverse resistance and eventual disease progression.

Lung Cancer

According to the WHO, lung cancer is the most common cancer in the world and it has retained this position for decades. There were an estimated 1.8 million new cases in 2012, 58% of which occurred in less developed regions of the world. Lung cancer is also the most common cause of death from cancer worldwide, estimated to be responsible for nearly one in five (19.4% of the total). Small cell lung cancer (SCLC), also called oat cell cancer, accounts for about 10%-15% of lung cancers. SCLC is particularly aggressive and often spreads quickly. Five-year survival rates range from approximately 30% in patients with "limited stage" disease to approximately 2% for patients with "extensive stage." Treatment options for people with SCLC include chemotherapy, radiation therapy and surgery. Non-small cell lung cancer (NSCLC) is the most common type of lung cancer, accounting for approximately 85% of lung cancers. Types of NSCLC include squamous cell carcinoma, adenocarcinoma and large cell carcinoma. The five-year survival rate for patients with NSCLC can be as high as 50% for patients diagnosed in the early stages of the disease. However for patients with metastases, the five-year survival is typically less than 5%. Treatment options for NSCLC also include surgery, chemotherapy and radiation. However, more recently approved targeted therapies and immunotherapies have become the standard of care. Targeted therapies include drugs that target tumor blood vessel growth (angiogenesis inhibitors), drugs that target growth factor receptors on the surface

of tumor cells (e.g., EGFR inhibitors) and drugs that target certain genes which have been found to have mutations which produce proteins that cause cancers to grow and spread (e.g., ALK inhibitors). In March 2015, nivolumab (Opdivo®), a PD-1 blocker, was the first immunotherapy to be approved by the FDA for lung cancer. The approval was based on a study demonstrating that patients with advanced squamous cell non-small cell lung cancer lived an average of 3.2 months longer than those who received chemotherapy, with approximately 15% of patients treated with Opdivo experiencing tumor shrinkage or complete disappearance. Our development plans include the study of MRX34 as a single agent in both small cell and non-small cell lung cancers, as well as in combination with targeted therapies or immunotherapy agents.

Our Product Pipeline

We have identified multiple tumor suppressor microRNAs that each regulate a unique set of genes and oncogenic pathways. We have developed mimics for these miRNAs and found that their anti-proliferative activities vary between different cancer cell lines likely as a result of the different oncogenes that the miRNAs regulate. Liposome encapsulation and systemic delivery of the most potent miRNA mimics has produced tumor regression in mouse models of liver cancer. Based on our in vitro and in vivo studies, we have selected our miR-34 mimic for clinical development and mimics of miR-101, miR-215, let-7, and miR-16 as candidates for future development either as monotherapies or as combination therapies. Brief overviews of each of the tumor suppressor miRNAs in our pipeline are provided below.

Reduced expression of miR-101 has been observed in the tumors of patients with bladder, breast, colon, gastric, liver, lung, ovarian, pancreatic, prostate and thyroid cancers. Reduced expression of miR-101 in the tumors of bladder, liver and non-small cell lung cancers is associated with poor prognosis. We believe that the tumor suppressor function of miR-101 derives from its capacity to regulate genes associated with angiogenesis, apoptosis, cancer stem cell development, cell cycle progression, epithelial-to-mesenchymal transition, metastasis and cell senescence. Published studies describe the therapeutic activity of miR-101 in mouse models of liver cancer, consistent with our in vivo studies.

The expression of miR-215 is regulated by the p53 tumor suppressor and has been observed to be lower in the tumors of patients with breast, colon, esophageal, kidney, and liver cancer as well as in multiple myeloma patients. Breast, colon, and kidney cancer patients with lower miR-215 tumor levels had shorter survival times, while liver cancer patients with lower miR-215 levels in their tumors were more likely to have metastatic disease. Pre-clinical studies show that introducing the tumor suppressor miRNA into cancer cells induces apoptosis and cell cycle arrest and inhibits proliferation and cell invasion/migration. In addition, miR-215 inhibits the capacity of cancer stem cells to form colonies in soft agar. Multiple published pre-clinical studies indicate that the anti-cancer activities of the miR-215 mimic are greater in cancer cells with an intact p53 gene than in cancer cells where the p53 gene is absent.

The expression levels of various members of the let-7 family of microRNAs have been observed to be reduced in the tumors of patients with melanoma, breast, kidney, lung, ovarian, pancreatic, prostate, and other cancers. Reduced expression of members of the let-7 family of microRNAs in the tumors of breast, kidney, lung and prostate cancers is associated with poor prognosis. The let-7 microRNA family has been implicated in the regulation of cell cycle progression, epithelial-to-mesenchymal transition, migration/invasion and transformation. Reduced let-7 expression appears to play a role in the development of stem-like properties in highly tumorigenic cancer cells.

Reduced levels of miR-16 are common in chronic lymphocytic leukemia, multiple myeloma and lymphomas as well as in breast, colon, gastric, lung and prostate tumors. Reduced miR-16 expression is associated with poor prognosis in patients with colon cancer and T-cell lymphoblastic leukemia. The

tumor suppressor function of miR-16 derives from its ability to regulate genes associated with angiogenesis, apoptosis, cell cycle progression, metastasis and migration. A third party has reported promising results in one of the six patients with malignant pleural mesothelioma being treated with its miR-16-based mimic.

We plan to complete preclinical in vitro and in vivo studies in 2015 that will enable the selection of a second microRNA from our pipeline for therapeutic development. We expect to complete IND-enabling toxicology studies, submit an IND application and initiate a Phase 1 trial for our second candidate in 2016.

Because each miRNA regulates a unique set of genes, we believe that the selection of miRNA-based therapies will be based upon the molecular characteristics of the tumors from the cancer patients. We believe that it is also likely that our miRNA-based therapies might be used in combination with one another to further maximize potency and drug development opportunities.

Scientific Advisors

We seek advice from our scientific advisory board, which consists of a number of leading scientists and physicians, on scientific and medical matters. Our scientific advisory board meets periodically to assess:

- our research and development programs;
- the design and implementation of our clinical programs;
- new technologies relevant to our research and development programs; and
- specific scientific and technical issues relevant to our business.

The current members of our scientific advisory board are as follows.

Corey Goodman, Ph.D. Dr. Corey Goodman is a Managing Partner of venBio, a private equity firm specializing in life sciences and an Adjunct Professor at UC Berkeley. Dr. Goodman serves as Chairman of the board of directors of Second Genome, Oligasis, Solstice Biologics, Heart Metabolics, and Alexo Therapeutics, and is a member of the board of directors of Checkmate Pharmaceuticals. Previously Dr. Goodman co-founded each of Alexo, Labrys Biologics, Second Genome, Solstice, Exelixis, and Renovis, and served as CEO of Renovis. Dr. Goodman was the President of the Pfizer, Biotherapeutics and Bioinnovation Center. Dr. Goodman is an elected member of the U.S. National Academy of Sciences, the American Academy of Arts and Sciences and the American Philosophical Society. Dr. Goodman is Chair of the California Council on Science and Technology, and previously served as the Chair of the National Research Council's Board on Life Sciences.

David H. Johnson, MD, MACP, FASCO. Dr. David H. Johnson is the Chairman of the Department of Internal Medicine at the University of Texas Southwestern Medical School in Dallas, Texas, and the Donald W. Seldin Distinguished Chair in Internal Medicine. Dr. Johnson served on the board of directors of the American Society of Clinical Oncology (ASCO), the American Board of Internal Medicine and the National Comprehensive Cancer Network (NCCN). Dr. Johnson also served on the Oncology Drug Advisory Committee (ODAC) at the FDA. Dr. Johnson is a recognized specialist in the area of non-small cell lung cancer.

Art Krieg, MD. Dr. Art Krieg serves as Founder and CEO at Checkmate Pharmaceuticals, and has worked in the oligonucleotide field since the 1980s. He co-founded Coley Pharmaceutical Group and served as the Chief Scientific Officer of Pfizer's Oligonucleotide Therapeutics Unit. Dr. Krieg subsequently co-founded RaNA Therapeutics, and served as Chief Scientific Officer at Sarepta Therapeutics. He co-founded the first antisense journal, *Nucleic Acid Therapeutics*, and the Oligonucleotide Therapeutic Society, for which he is currently President-elect.

Frank J. Slack, PhD. Dr. Frank J. Slack is the Director of the Institute for RNA Medicine in the Department of Pathology at BIDMC Cancer Center/Harvard Medical School. The Slack laboratory studies the roles of microRNAs and their targets in cancer, development and aging. He started work on microRNAs as a postdoctoral fellow in Dr. Gary Ruvkun's laboratory at Harvard Medical School, where he co-discovered let-7, the first known human microRNA.

Alan P. Venook, M.D. Dr. Alan Venook is the Madden Family Distinguished Professor of Medical Oncology and Translational Research at the University of California San Francisco, where he leads the Gastrointestinal Oncology clinical program. Dr. Venook was the founding Chair of the National Cancer Institute's (NCI) Hepatobiliary Task Force. He served as Chair of the Gastrointestinal Committee of the Alliance for Clinical Trials in Oncology. An internationally recognized expert in colorectal and liver cancers, Dr. Venook is currently an Associate Editor of the *Journal of Clinical Oncology*. He was Chair of the Scientific Program for ASCO 2015.

Daniel D. Von Hoff, M.D., F.A.C.P. Dr. Daniel D. Von Hoff, a medical oncologist, is currently Physician in Chief, Distinguished Professor at the Translational Genomic Research Institute (TGen), Professor of Medicine, Mayo Clinic and Chief Scientific Officer for US Oncology and for Honor Health's Clinical Research Institute. He was appointed to President Bush's National Cancer Advisory Board. Dr. Von Hoff is also the past President of the American Association for Cancer Research (AACR), was on the AACR and the American Society of Clinical Oncology's Board of Directors and is a fellow of the American College of Physicians.

Steve Weitman, M.D., Ph.D. Dr. Steve Weitman is a Professor at the Institute for Drug Development at the Cancer Therapy and Research Center in San Antonio, Texas. Dr. Weitman was the Chief Medical Officer and member of the Executive Committee at ILEX Oncology and led development and FDA approval of clofarabine. He was an Associate Editor of *Investigational New Drugs*.

Manufacturing

We contract with third parties to manufacture our compounds for nonclinical and clinical testing purposes and intend to do so in the future. We also expect to rely upon third parties to produce materials required for the commercial production of our product candidates if we succeed in obtaining the necessary regulatory approvals. We do not currently own or operate facilities for product manufacturing, storage and distribution or testing. We have personnel with the technical, manufacturing, analytical, quality and project management experience to oversee contract manufacturing and testing activities and to compile manufacturing and quality information for our regulatory submissions.

Manufacturing is subject to extensive regulations that impose various procedural and documentation requirements, which govern recordkeeping, manufacturing processes and controls, personnel, quality control and quality assurance. Our systems and contractors are required to be in compliance with these regulations, and we assess such compliance regularly through performance monitoring as well as a formal audit program.

We continue to take steps to reduce our costs by working to improve yield in the manufacturing of the microRNA mimic, the drug substance, the liposomal formulation and the drug product, and we have and will continue to manage our vendor and supplier costs and evaluate alternative manufacturers and suppliers for MRX34 and our other pipeline candidates. As we move further through clinical development towards commercialization of MRX34 and our other pipeline microRNA mimics, we will need to work with our third party manufacturers to scale up the manufacturing processes for such products, and we expect we will be able to realize additional efficiencies resulting from increased scale of production, which we believe will result in lower costs and better operating margins.

Drug Substance

We currently use NITTO DENKO Avecia, or Avecia, to manufacture our MRX34 drug substance. We entered into a long term clinical supply agreement with Avecia in March 2012, and we believe that Avecia has the technical, analytical, quality and regulatory expertise to reliably produce our miR-34 mimic in sufficient quantity and of acceptable quality to support our development program through at least Phase 3 clinical studies, and to scale up such manufacturing process to support commercial production of MRX34. To ensure adequate supply and supply continuity, we are currently evaluating a backup supplier for our MRX34 drug substance, which will be completed in the second half of 2015. We are evaluating other U.S. and overseas companies for the manufacture of drug substance for our pipeline microRNA mimics.

The process for manufacturing our miR-34 mimic drug substance utilizes well-established solid phase synthesis chemistry. The raw materials used in the process are readily available from a number of qualified suppliers. We currently rely on our contract manufacturers to manage the supply chain for the raw materials used in the process.

Drug Product

Our drug product for both MRX34 and our other microRNA mimics consists of the drug substance formulated in the SMARTICLES liposomal delivery system. The drug product is provided as a concentrated, frozen aqueous solution that is defrosted, thawed and diluted for infusion in the clinic.

Polymun Scientific Immunbiologische Forschung GmbH, or Polymun, located in Vienna, Austria, is currently the exclusive manufacturer of drug product for our lead therapeutic candidate, MRX34. In November 2012, we entered into a manufacturing and supply agreement with Polymun for the formulation, manufacture and packaging of MRX34 final drug product. Manufacture of the drug product for our microRNA mimics in conjunction with the SMARTICLES delivery system requires a high level of technical expertise, and Polymun is one of a limited number of contract manufacturers with the know-how to manufacture drug product for our drug candidate in sufficient quantity and of sufficient quality to meet our projected clinical and commercial needs. We believe that Polymun currently has the capability to provide a sufficient quantity of drug product through at least Phase 3 clinical studies of MRX34, and although Polymun does not currently have the capability to scale up their manufacturing process to support commercialization of MRX34, we believe that Polymun will have sufficiently expanded its operations before we reach potential commercialization of MRX34 such that it should be able to provide a sufficient quantity of drug product to support such commercialization of MRX34. In the meantime, we intend to continue to work with Polymun in relation to both our clinical supply and increasing production capacity for our projected commercial needs, but also to evaluate other potential manufacturers of drug product for our microRNA mimics. See "Business—Strategic Partnerships and Collaborations" for a detailed description of our manufacturing and supply agreement with Polymun, including material terms relating to circumstances permitting termination of this agreement.

The liposomal formulation manufactured by Polymun is a combination of readily available excipients, plus two specialty lipid excipients which are currently manufactured by two qualified suppliers.

The product is shipped and stored under frozen conditions. Based on current stability studies, we expect that the drug product will be stable over the time period anticipated for currently-planned clinical studies.

Research and Development

We are conducting clinical trials and other development activities to support the development of MRX34 and our other product candidates. In the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2015, we incurred $2.7 million, $4.4 million, $10.5 million and $7.9 million, respectively, of research and development expense.

Our research programs are directed towards the following:

- Determining if biomarkers can be used to select cancer patients who are more likely to respond to MRX34 therapy.
- Selecting and developing a second miRNA-based therapeutic candidate for which we intend to begin clinical development in 2016.
- Identifying drugs that can be combined with MRX34 to significantly improve the clinical response rates of cancer patients.
- Developing a next-generation systemic delivery technology that will improve the tolerability and efficacy profiles of miRNA mimics and expand the cancer indications that can be targeted for therapeutic intervention.

Intellectual Property

We strive to protect and enhance the proprietary technologies that we believe are important to our business, including seeking and maintaining patents intended to cover our products and compositions, their methods of use and any other inventions that are important to the development of our business. We also rely on trade secrets to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection.

Our success will depend in part on our ability to obtain and maintain patent and other proprietary protection for commercially important technology, inventions and know-how related to our business, defend and enforce our patents, maintain our licenses, preserve our trade secrets and operate without infringing valid and enforceable patents and other proprietary rights of third parties. We also rely on continuing technological innovation and in-licensing opportunities to develop, strengthen and maintain our proprietary position in the field of microRNA therapeutics. Our objective is to continue to expand our intellectual property portfolio to protect and bolster our position as a leader in the field of microRNA therapeutics.

Our Patent Portfolio

We own or in-license a portfolio of patents and patent applications that protects various aspects of our business. The patents and patent applications that make up our patent portfolio are primarily focused on various aspects of microRNA therapeutics, including various microRNA mimics, such as our lead product candidate MRX34, and therapeutic methods of use of microRNAs, including MRX34. As of July 1, 2015, we own or in-license over 10 issued U.S. patents and over 42 pending U.S. and ex-U.S. patent applications. The expiration dates of the currently issued patents range from 2025 to 2032. We also have multiple pending patent applications that, if they issue, will expire between 2025 and 2035.

We are the sole owner of multiple U.S. and foreign patents and patent applications that relate to various aspects of microRNA therapies, including mir-34 therapies. Some of these patents and patent applications relate to chemically modified versions of miR-34 not currently used in MRX34 and other proprietary compounds that are possible candidates for future product development as microRNA therapeutics. For example, one of our owned patents (U.S. Patent No. 8,586,727) claims miR-34 mimics with certain nucleotide modifications. This patent is projected to expire in 2032.

We in-license a significant portion of our patent portfolio from our founding company, Asuragen, under a fully paid-up, royalty-free, fully sublicensable and irrevocable license granting us exclusive rights to these patents and patent applications in the field of therapeutics. Asuragen retains exclusive rights in these patents in fields outside therapeutics, including diagnostics. To date, the license from Asuragen has resulted in at least seven issued U.S. patents, and there are multiple applications pending within the United States and outside the United States, including Europe, Canada, Australia and Japan. These patents include U.S. Patent 7,960,359, which is related to the use of miR-34a for reducing the cell viability of lung cancer cells, cancerous T cells, prostate cancer cells, or skin cancer cells and is projected to expire in 2025. They also include U.S. Patent 8,563,708, which claims multiple chemistries and structures used in therapeutic microRNA mimics and is projected to expire in 2025. The patents and patent applications licensed from Asuragen are also included within the patents licensed under our agreement with Yale, and are therefore subject to the terms of the February 2014 amended and restated agreement as described below in "Strategic Partnerships and Collaborations—Yale University."

We are the exclusive licensee under a patent family owned by the University of Zurich relating to treatment of certain types of B-cell lymphoma with certain microRNA mimics, including miR-34. The patent family includes one granted U.S. patent related to use of a miR-34 microRNA for the treatment of diffuse large B-cell lymphoma, one pending U.S. patent application and one pending European patent application. This patent and any patents that issue from the pending patent applications are expected to expire in 2031. We are also the exclusive licensee of two U.S. patents owned by Yale relating to uses of let-7 microRNAs. These patents are expected to expire in 2025.

Patent Term

The term of individual patents and patent applications in our portfolio will depend upon the legal term of the patents in the countries in which they are obtained. In most countries, the patent term is 20 years from the date of filing of the patent application (or parent application, if applicable). For example, if an international Patent Cooperation Treaty, or PCT, application is filed, any patent issuing from the PCT application in a specific country expires 20 years from the filing date of the PCT application. In the United States, however, if a patent was in force on June 8, 1995, or issued on an application that was filed before June 8, 1995, that patent will generally have a term that is the greater of twenty years from the filing date or 17 years from the date of issue.

Under the Hatch-Waxman Act, the term of a patent that covers an FDA-approved drug or biological product may also be eligible for patent term extension, or PTE. PTE permits restoration of a portion of the patent term of a U.S. patent as compensation for the patent term lost during product development and the FDA regulatory review process if approval of the application for the product is the first permitted commercial marketing of a drug or biological product containing the active ingredient. The patent term restoration period is generally one-half the time between the effective date of an IND and the submission date of a new drug application, or NDA, plus the time between the submission date of an NDA and the approval of that application. The Hatch-Waxman Act permits the owner of a patent to apply for a PTE for only one patent applicable to an approved drug, and the maximum period of restoration is five years beyond the expiration of the patent. A PTE cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval, and a patent can only be extended once, and thus, even if a single patent is applicable to multiple products, it can only be extended based on one product. Similar provisions may be available in Europe and certain other foreign jurisdictions to extend the term of a patent that covers an approved drug. When possible, depending upon the length of clinical trials and other factors involved in the filing of an NDA, we expect to apply for PTEs for patents covering our product candidates and their methods of use, or to work with our licensors, as owners of such patents, to obtain such extensions, if available.

Competition

The biotechnology and pharmaceutical industries are characterized by intense and rapidly changing competition to develop new technologies and proprietary products. While we believe that our intellectual property portfolio, scientific expertise and leading clinical position in the microRNA field provide us with competitive advantages, we face potential competition from many different sources, including larger and better-funded pharmaceutical and biotechnology companies. We may compete with other companies that are focused on microRNA therapeutics in disease or indications in which we develop our products, including both (i) replacement therapy approaches that involve the delivery of mimics, and (ii) inhibition approaches that involve the use of AntagomiRs, or anti-miRs. Any products that we may commercialize will have to compete with existing therapies and new therapies that may become available in the future.

We are aware of several companies that are working specifically to develop microRNA therapeutics. miRagen Therapeutics, Inc., or miRagen, a privately held company based in Boulder, Colorado, uses anti-miRs with an initial focus in cardiovascular, metabolic diseases, and hematological cancers. miRagen is in preclinical development, has entered into a partnership with Laboratoires Servier to focus on three different targets in the cardiovascular and metabolic space and has also expressed interest in pursuing microRNA mimic development, which they call "pro-miRs." Regulus Therapeutics, Inc., or Regulus, is a publicly traded company based in Carlsbad, California, which primarily focuses on anti-miRs technology, or the inhibition of overexpressed microRNAs. Regulus has focused on a number of indications, including hepatitis C, kidney fibrosis and cancer. They initiated their first clinical trial for RG-101, their lead anti-miR therapeutic program, against miR-122 for hepatitis C in March 2014, and initiated a Phase 1 clinical trial evaluating RG-012 in healthy volunteers for the treatment of Alport syndrome in June 2015, while other programs are still in preclinical development. Regulus has numerous research and development collaborations with large pharmaceutical and biotechnology companies, including AstraZeneca plc, Biogen Idec, Inc., GlaxoSmithKline plc and Sanofi S.A. Santaris Pharma A/S, or Santaris, was a publicly traded company based in Denmark using RNA-targeted antagonist therapy for diseases including metabolic disorders, infectious and inflammatory diseases, cancer and rare genetic disorders. In August 2014, Roche announced the acquisition to Santaris Pharma. Santaris (now Roche) has drug candidates in Phase 1 and Phase 2 clinical trials, and their lead therapeutic product, an antagonist to miR-122, has reached late Phase 2 clinical testing for hepatitis C. EnGenIC is a privately held Australian company developing a nanocell platform for delivery of cancer therapeutics and other therapeutic molecules. In November 2014, EnGenIC announced initiation of a Phase 1 clinical trial of its delivery system packaged with a miR-16-based microRNA for the treatment of malignant pleural mesothelioma. A patient case study from this study was recently published in the *American Journal of Respiratory and Critical Care Medicine*.

These competitors also compete with us in recruiting human capital and securing licenses to complementary technologies or specific microRNAs that may be critical to the success of our business. They also compete with us for potential funding from the pharmaceutical industry.

Government Regulation

The FDA and comparable regulatory authorities in state and local jurisdictions and in other countries impose substantial and burdensome requirements upon companies involved in the clinical development, manufacture, marketing and distribution of drugs, such as those we are developing. These agencies and other federal, state and local entities regulate, among other things, the research and development, testing, manufacture, quality control, safety, effectiveness, labeling, storage, record keeping, approval, advertising and promotion, distribution, post-approval monitoring and reporting, sampling and export and import of our product candidates.

In the United States, the FDA regulates drug products under the Federal Food, Drug and Cosmetic Act, or FFDCA, and the FDA's implementing regulations. Drugs are also subject to other federal, state and local statutes and regulations. If we fail to comply with applicable FDA or other requirements at any time during the drug development process, clinical testing, the approval process or after approval, we may become subject to administrative or judicial sanctions. These sanctions could include, among other things, the FDA's refusal to approve pending applications, license suspension or revocation, withdrawal of an approval, warning letters, product recalls, clinical holds, product seizures, total or partial suspension of production or distribution, injunctions, fines, civil penalties or criminal prosecution. Any FDA enforcement action could have a material adverse effect on us.

FDA approval is required before any new unapproved drug or dosage form, including a new use of a previously approved drug, can be marketed in the United States. The process required by the FDA before a drug may be marketed in the United States generally involves:

- completion of extensive nonclinical laboratory tests, nonclinical animal studies and formulation studies many of which must be performed in accordance with the FDA's current Good Laboratory Practice, or cGLP, regulations;
- submission to the FDA of an IND application which must become effective before human clinical trials in the United States may begin;
- approval by an independent IRB at each clinical trial site before each trial may be initiated;
- performance of adequate and well-controlled human clinical trials to establish the safety and efficacy of the drug candidate for each proposed indication in accordance with the FDA's current Good Clinical Practice, or cGCP, regulations;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities at which the drug is produced to assess compliance with current Good Manufacturing Practice, or cGMP, regulations;
- submission to the FDA of an NDA;
- satisfactory completion of a potential review by an FDA advisory committee, if applicable; and
- FDA review and approval of the NDA prior to any commercial marketing, sale or shipment of the drug.

The nonclinical and clinical testing and approval process requires substantial time, effort and financial resources, and we cannot be certain that any approvals for our product candidates will be granted on a timely basis, if at all. Nonclinical tests include laboratory evaluation of product chemistry, formulation, stability and toxicity, as well as animal studies to assess the characteristics and potential safety and efficacy of the product. The results of nonclinical tests, together with manufacturing information, analytical data and a proposed clinical trial protocol and other information, are submitted as part of an IND to the FDA. Some nonclinical testing may continue even after the IND is submitted. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA, within the 30-day time period, raises concerns or questions relating to one or more proposed clinical trials and places the clinical trial on a clinical hold, including concerns that human research subjects will be exposed to unreasonable health risks. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. As a result, a submission of an IND may not result in FDA authorization to commence a clinical trial. A separate submission to an existing IND must also be made for each successive clinical trial conducted during product development.

Clinical trials involve the administration of the investigational drug to human subjects under the supervision of qualified investigators. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial, the parameters to be used in monitoring safety and the

effectiveness criteria to be used. Each protocol must be submitted to the FDA as part of the IND. An IRB for each medical center proposing to conduct a clinical trial must also review and approve a plan for any clinical trial before it can begin at that center and the IRB must monitor the clinical trial until it is completed. The FDA, the IRB, or the sponsor may suspend or discontinue a clinical trial at any time on various grounds, including a finding that the subjects are being exposed to an unacceptable health risk. Clinical testing also must satisfy cGCP requirements, including the requirement to obtain effective informed consent from study subjects.

All clinical research performed in the United States in support of an NDA must be authorized in advance by the FDA under the IND regulations and procedures described above. However, a sponsor who wishes to conduct a clinical trial outside the United States may, but need not, obtain FDA authorization to conduct the clinical trial under an IND. If a foreign clinical trial is not conducted under an IND, the sponsor may submit data from the clinical trial to the FDA in support of an NDA so long as the clinical trial is conducted in compliance with an international guideline for the ethical conduct of clinical research known as the Declaration of Helsinki and/or the laws and regulations of the country or countries in which the clinical trial is performed, whichever provides the greater protection to the participants in the clinical trial.

Clinical Trials

For purposes of NDA submission and approval, clinical trials are typically conducted in three or four sequential phases, which may overlap or be combined.

- *Phase 1:* Clinical trials are initially conducted in a limited population of subjects to test the drug candidate for safety, dose tolerance, absorption, metabolism, distribution and excretion in healthy humans or, on occasion, in patients with severe problems or life-threatening diseases to gain an early indication of its effectiveness.

- *Phase 2:* Clinical trials are generally conducted in a limited patient population to evaluate dosage tolerance and appropriate dosage, identify possible adverse effects and safety risks, and evaluate preliminarily the efficacy of the drug for specific indications in patients with the disease or condition under study.

- *Phase 3:* Clinical trials are typically conducted when Phase 2 clinical trials demonstrate that a dose range of the product candidate is effective and has an acceptable safety profile. Phase 3 clinical trials are commonly referred to as "pivotal" studies, which typically denotes a study that presents the data that the FDA or other relevant regulatory agency will use to determine whether or not to approve a drug. Phase 3 clinical trials are generally undertaken with large numbers of patients, such as groups of several hundred to several thousand, to further evaluate dosage, to provide substantial evidence of clinical efficacy and to further test for safety in an expanded and diverse patient population at multiple, geographically-dispersed clinical trial sites.

- *Phase 4:* In some cases, FDA may condition approval of an NDA for a product candidate on the sponsor's agreement to conduct additional clinical trials after NDA approval. In other cases, a sponsor may voluntarily conduct additional clinical trials post approval to gain more information about the drug. Such post approval trials are typically referred to as Phase 4 clinical trials.

The FDA, the IRB or the clinical trial sponsor may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research subjects are being exposed to an unacceptable health risk. Additionally, some clinical trials are overseen by an independent group of qualified experts organized by the clinical trial sponsor, known as a data safety monitoring board or committee. This group provides authorization for whether or not a trial may move forward at designated check points based on access to certain data from the study. We may also voluntarily suspend or terminate a clinical trial based on evolving business objectives and/or competitive climate.

Concurrent with clinical trials, companies usually complete additional animal trials and must also develop additional information about the chemistry and physical characteristics of the drug and finalize a process for manufacturing the drug in commercial quantities in accordance with cGMP requirements. The manufacturing process must be capable of consistently producing quality batches of the drug candidate and, among other things, the manufacturer must develop methods for testing the identity, strength, quality and purity of the final drug product. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the drug candidate does not undergo unacceptable deterioration over its shelf life.

New Drug Applications

The results of nonclinical studies and of the clinical trials, including negative or ambiguous results as well as positive findings, together with other detailed information, including extensive manufacturing information and information on the composition of the drug, are submitted to the FDA in the form of an NDA requesting approval to market the drug for one or more specified indications. The FDA reviews an NDA to determine, among other things, whether a drug is safe and effective for its intended use.

Once an NDA has been accepted for filing, by law the FDA has 180 days to review the application and respond to the applicant. However, the review process is often significantly extended by FDA requests for additional information or clarification. Under the Prescription Drug User Fee Act, the FDA has a goal of responding to NDAs within 10 months of the filing date for standard review, but this timeframe is also often extended. The FDA may refer the application to an advisory committee for review, evaluation and recommendation as to whether the application should be approved. The FDA is not bound by the recommendation of an advisory committee, but it generally follows such recommendations. Before approving an application, the FDA will inspect the facility or the facilities at which the finished drug product, and sometimes the active drug ingredient, is manufactured, and will not approve the drug unless cGMP compliance is satisfactory. The FDA may also inspect the sites at which the clinical trials were conducted to assess their compliance, and will not approve the drug unless compliance with cGCP requirements is satisfactory.

After the FDA evaluates the NDA and conducts its inspections, it may issue an approval letter or a Complete Response Letter. An approval letter authorizes commercial marketing of the drug with specific prescribing information for specific indications. A Complete Response Letter indicates that the review cycle of the application is complete and the application is not ready for approval. A Complete Response Letter may require additional clinical data and/or an additional pivotal Phase 3 clinical trial(s), and/or other significant, expensive and time-consuming requirements related to clinical trials, nonclinical studies or manufacturing. Even if such data are submitted, the FDA may ultimately decide that the NDA does not satisfy the criteria for approval. Data from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret data. The FDA could also approve the NDA with a Risk Evaluation and Mitigation Strategy, or REMS, plan to mitigate risks, which could include medication guides, physician communication plans, or elements to assure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. The FDA also may condition approval on, among other things, changes to proposed labeling, development of adequate controls and specifications, or a commitment to conduct one or more post-market studies or clinical trials. Such post-market testing may include Phase 4 clinical trials and surveillance to further assess and monitor the product's safety and effectiveness after commercialization. Regulatory approval of oncology products often requires that patients in clinical trials be followed for long periods after approval to determine the overall survival benefit of the drug. The FDA has the authority to prevent or limit further marketing of a drug based on the results of these post-marketing programs.

Drugs may be marketed only for the FDA approved indications and in accordance with the provisions of the approved labeling. Further, if there are any modifications to the drug, including changes in indications, labeling, or manufacturing processes or facilities, the applicant may be required to submit and obtain FDA approval of a new NDA or NDA supplement, which may require us to develop additional data or conduct additional nonclinical studies and clinical trials. Depending on the nature of the change proposed, an NDA supplement must be filed and approved before the change may be implemented. For many proposed post-approval changes to an NDA, the FDA has up to 180 days to review the application. As with new NDAs, the review process is often significantly extended by the FDA requests for additional information or clarification.

The testing and approval processes require substantial time, effort and financial resources, and each may take several years to complete. The FDA may not grant approval on a timely basis, or at all. Even if we believe a clinical trial has demonstrated safety and efficacy of one of our drug candidates for the treatment of a disease, the results may not be satisfactory to the FDA. Nonclinical and clinical data may be interpreted by the FDA in different ways, which could delay, limit or prevent regulatory approval. We may encounter difficulties or unanticipated costs in our efforts to secure necessary governmental approvals, which could delay or preclude us from marketing drugs. The FDA may limit the indications for use or place other conditions on any approvals that could restrict the commercial application of the drugs.

Other Regulatory Requirements

Any drugs manufactured or distributed by us or our collaborators pursuant to FDA approvals would be subject to continuing regulation by the FDA, including recordkeeping requirements and reporting of adverse experiences associated with the drug. Drug manufacturers and their subcontractors are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with ongoing regulatory requirements, including cGMPs, which impose certain procedural and documentation requirements upon us and our third party manufacturers. Failure to comply with the statutory and regulatory requirements can subject a manufacturer to possible legal or regulatory action, such as warning letters, suspension of manufacturing, seizure of product, injunctive action or possible civil penalties. We cannot be certain that we or our present or future third-party manufacturers or suppliers will be able to comply with the cGMP regulations and other ongoing FDA regulatory requirements. If we or our present or future third-party manufacturers or suppliers are not able to comply with these requirements, the FDA may halt our clinical trials, require us to recall a drug from distribution or withdraw approval of the NDA for that drug.

The FDA closely regulates the post-approval marketing and promotion of drugs, including standards and regulations for direct-to-consumer advertising, off-label promotion, industry-sponsored scientific and educational activities and promotional activities involving the internet. A company can make only those claims relating to safety and efficacy that are approved by the FDA. Failure to comply with these requirements can result in adverse publicity, warning letters, corrective advertising and potential civil and criminal penalties. Physicians may prescribe legally available drugs for uses that are not described in the product's labeling and that differ from those tested by us and approved by the FDA. Such off-label uses are common across medical specialties. Physicians may believe that such off-label uses are the best treatment for many patients in varied circumstances. The FDA does not regulate the behavior of physicians in their choice of treatments. The FDA does, however, impose stringent restrictions on manufacturers' communications regarding off-label use.

Expedited Review and Accelerated Approval Programs

A sponsor may seek approval of its product candidate under programs designed to accelerate FDA's review and approval of NDAs. For example, Fast Track Designation may be granted to a drug

intended for treatment of a serious or life-threatening disease or condition that has potential to address unmet medical needs for the disease or condition. The key benefits of fast track designation are potential eligibility for priority review, rolling review (submission of portions of an application before the complete marketing application is submitted), and accelerated approval, if relevant criteria are met. Based on results of clinical studies submitted in an NDA, upon the request of an applicant, the FDA may grant the NDA a priority review designation, which sets the target date for FDA action on the application at six months after the FDA accepts the application for filing. Priority review is granted where there is evidence that the proposed product would be a significant improvement in the safety or effectiveness of the treatment, diagnosis, or prevention of a serious condition. If criteria are not met for priority review, the application is subject to the standard FDA review period of 10 months after FDA accepts the application for filing. Priority review designation does not change the scientific/medical standard for approval or the quality of evidence necessary to support approval.

Under the accelerated approval program, the FDA may approve an NDA on the basis of either a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity, or prevalence of the condition and the availability or lack of alternative treatments. Post-marketing studies or completion of ongoing studies after marketing approval are generally required to verify the drug's clinical benefit in relationship to the surrogate endpoint or ultimate outcome in relationship to the clinical benefit. In addition, the Food and Drug Administration Safety and Innovation Act, or FDASIA, which was enacted and signed into law in 2012, established the new Breakthrough Therapy designation. A sponsor may seek FDA designation of its product candidate as a breakthrough therapy if the drug is intended, alone or in combination with one or more other drugs, to treat a serious or life-threatening disease or condition and preliminary clinical evidence indicates that the drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. We may consider seeking Breakthrough Therapy designation of MRX34 in the future.

Orphan Drug Designation and Exclusivity

Under the Orphan Drug Act, the FDA may grant orphan drug designation to drugs intended to treat a rare disease or condition, which is generally defined as a disease or condition that affects fewer than 200,000 individuals in the United States. Orphan drug designation must be requested before submitting an NDA. In the United States, orphan drug designation entitles a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages and user-fee waivers. After the FDA grants orphan drug designation, the generic identity of the drug and its potential orphan use are disclosed publicly by the FDA. Orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process. The first NDA applicant to receive FDA approval for a particular active ingredient to treat a particular disease with FDA orphan drug designation is entitled to a seven-year exclusive marketing period in the United States for that product, for that indication. During the seven-year exclusivity period, the FDA may not approve any other applications to market the same drug for the same orphan indication, except in limited circumstances, such as a showing of clinical superiority to the product with orphan exclusivity or if FDA finds that the holder of the orphan drug exclusivity has not shown that it can assure the availability of sufficient quantities of the orphan drug to meet the needs of patients with the disease or condition for which the drug was designated. However, the FDA can still approve other drugs that have a different active ingredient for use in treating the same indication or disease. While we have not sought or obtained orphan drug designation for MRX34, we plan to seek such designation in the future for HCC, certain hematological malignancies or other potential future indications.

Other Healthcare Laws

Although we currently do not have any products on the market, if our drug candidates are approved and we begin commercialization, we may be subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which we conduct our business. Such laws include, without limitation, state and federal anti-kickback, fraud and abuse, false claims, privacy and security, price reporting and physician sunshine laws and regulations.

The Anti-Kickback Statute makes it illegal for any person, including a prescription drug manufacturer (or a party acting on its behalf) to knowingly and willfully solicit, receive, offer, or pay any remuneration that is intended to induce the referral of business, including the purchase, order, or prescription of a particular drug, for which payment may be made under a federal healthcare program, such as Medicare or Medicaid. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it to have committed a violation. Violations of this law are punishable by up to five years in prison, and can also result in criminal fines, administrative civil money penalties and exclusion from participation in federal healthcare programs. In addition, the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act. Many states have also adopted laws similar to the Anti-Kickback Statute. Some of these state prohibitions apply to the referral of patients for healthcare services reimbursed by any insurer, not just federal healthcare programs such as Medicare and Medicaid. Due to the breadth of these federal and state anti-kickback laws, the absence of guidance in the form of regulations or court decisions, and the potential for additional legal or regulatory change in this area, it is possible that our future sales and marketing practices and/or our future relationships with physicians might be challenged under these laws, which could harm us.

The federal False Claims Act prohibits anyone from knowingly presenting, or causing to be presented, for payment to federal programs (including Medicare and Medicaid) claims for items or services, including drugs, that are false or fraudulent, claims for items or services not provided as claimed, or claims for medically unnecessary items or services. Although we would not submit claims directly to payors, manufacturers can be held liable under these laws if they are deemed to "cause" the submission of false or fraudulent claims by, for example, providing inaccurate billing or coding information to customers or promoting a product off-label. In addition, our future activities relating to the reporting of wholesaler or estimated retail prices for our products, the reporting of prices used to calculate Medicaid rebate information and other information affecting federal, state and third-party reimbursement for our products, and the sale and marketing of our products, are subject to scrutiny under this law. For example, pharmaceutical companies have been prosecuted under the federal False Claims Act in connection with their off-label promotion of drugs. Penalties for False Claims Act violations include three times the actual damages sustained by the government, plus mandatory civil penalties of between $5,500 and $11,000 for each separate false claim, the potential for exclusion from participation in federal healthcare programs, and, although the federal False Claims Act is a civil statute, False Claims Act violations may also implicate various federal criminal statutes. If the government were to allege that we were, or convict us of, violating these false claims laws, we could be subject to a substantial fine and may suffer a decline in our stock price. In addition, private individuals have the ability to bring actions under the federal False Claims Act and certain states have enacted laws modeled after the federal False Claims Act.

The federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, also created new federal criminal statutes that prohibit among other actions, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, including private third-party payors, knowingly and willfully embezzling or stealing from a healthcare benefit program, willfully obstructing a criminal investigation of a healthcare offense, and knowingly and willfully falsifying,

concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services. Similar to the federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation.

In addition, there has been a recent trend of increased federal and state regulation of payments made to physicians. The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively, the Affordable Care Act, imposed new reporting requirements on drug manufacturers for payments made by them, and, in some case, their distributors, to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. Failure to submit required information may result in civil monetary penalties of up to an aggregate of $150,000 per year (and up to an aggregate of $1 million per year for "knowing failures"), for all payments, transfers of value or ownership or investment interests not reported in an annual submission. Manufacturers must submit reports by the 90th day of each calendar year.

There are also an increasing number of state laws that require manufacturers to implement compliance programs, impose restrictions on drug manufacturer marketing practices and require the tracking and reporting of gifts, compensation and other remuneration to physicians and other health care providers. These laws may affect our sales, marketing and other promotional activities by imposing administrative and compliance burdens on us. In addition, given the lack of clarity with respect to these laws and their implementation, our reporting actions could be subject to the penalty provisions of the pertinent state and federal authorities.

We may also be subject to data privacy and security regulation by both the federal government and the states in which we conduct our business. HIPAA, as amended by the Health Information Technology and Clinical Health Act, or HITECH, and their respective implementing regulations, including the final omnibus rule published on January 25, 2013, imposes specified requirements relating to the privacy, security and transmission of individually identifiable health information. Among other things, HITECH makes HIPAA's privacy and security standards directly applicable to "business associates," defined as independent contractors or agents of covered entities that create, receive, maintain or transmit protected health information in connection with providing a service for or on behalf of a covered entity. HITECH also increased the civil and criminal penalties that may be imposed against covered entities, business associates and possibly other persons, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorney's fees and costs associated with pursuing federal civil actions. In addition, state laws govern the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways, thus complicating compliance efforts.

Because we intend to commercialize products that could be reimbursed under a federal healthcare program and other governmental healthcare programs, we will have to develop a comprehensive compliance program that establishes internal controls to facilitate adherence to the rules and program requirements to which we will or may become subject. Although compliance programs can mitigate the risk of investigation and prosecution for violations of these laws, the risks cannot be entirely eliminated. If our operations are found to be in violation of any of such laws or any other governmental regulations that apply to us, we may be subject to penalties, including, without limitation, civil and criminal penalties, damages, fines, the curtailment or restructuring of our operations, exclusion from participation in federal and state healthcare programs and imprisonment, any of which could adversely affect our ability to operate our business and our financial results.

Coverage and Reimbursement

Sales of our products, if approved, will depend, in part, on the extent to which our products will be covered by third-party payors, such as government health care programs, commercial insurance and managed healthcare organizations. These third-party payors are increasingly reducing reimbursements for certain medical products and services. In addition, the U.S. government, state legislatures and foreign governments have continued implementing cost containment programs, including price controls and restrictions on reimbursement. and requirements for substitution of generic products. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit our net revenue and results. Decreases in third-party reimbursement for our products once approved or a decision by a third-party payor to not cover our products could reduce or eliminate utilization of our products and have a material adverse effect on our sales, results of operations and financial condition. In addition, state and federal healthcare reform measures have been and will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our products once approved or additional pricing pressures.

Health Care Reform

In March 2010, the Affordable Care Act, was enacted, which includes measures that have or will significantly change the way health care is financed by both governmental and private insurers. Among the provisions of Affordable Care Act of greatest importance to the pharmaceutical industry are the following:

- An increase in the minimum rebates payable by manufacturers under the Medicaid Drug Rebate Program on most branded prescription drugs and biologic agents from 15.1% of average manufacturer price, or AMP, to 23.1% of AMP.
- A new rebate calculation for "line extensions" (i.e., new formulations, such as extended release formulations) of solid oral dosage forms of branded products.
- An extension of manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations.
- An expansion of the population potentially eligible for Medicaid drug benefits, to be phased-in by 2014.
- An expansion of the types of entities eligible for discounts under the 340B drug pricing program, excluding orphan drugs when used for the orphan indication, with the exception of children's hospitals.
- A requirement on manufacturers of branded drugs and biologic agents to provide a 50% discount off the negotiated price of branded drugs dispensed to Medicare Part D patients in the coverage gap (i.e., "donut hole").
- An annual, nondeductible fee on any entity that manufactures or imports certain branded prescription drugs and biologic agents, apportioned among these entities according to their market share in certain government healthcare programs, although this fee would not apply to sales of certain products approved exclusively for orphan indications.
- Creation of a new Patient-Centered Outcomes Research to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research. The research conducted by the Patient-Centered Outcomes Research Institute may affect the market for certain pharmaceutical products.

- Creation of the Independent Payment Advisory Board which, beginning in 2014, has authority to recommend certain changes to the Medicare program to reduce expenditures by the program that could result in reduced payments for prescription drugs. Under certain circumstances, these recommendations will become law unless Congress enacts legislation that will achieve the same or greater Medicare cost savings.

- Establishment of a Center for Medicare and Medicaid Innovation within the Centers for Medicare & Medicaid Services, or CMS, to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending. Funding has been allocated to support the mission of the Center for Medicare and Medicaid Innovation from 2011 to 2019.

Many of the details regarding the implementation of Affordable Care Act are yet to be determined, and, at this time, it remains unclear the full effect that Affordable Care Act would have on our business.

Other legislative changes have also been proposed and adopted in the United States since the Affordable Care Act was enacted. On August 2, 2011, the Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions to Medicare payments to providers of 2% per fiscal year, which went into effect on April 1, 2013 and, due to subsequent legislative amendments, will remain in effect through 2024 unless additional Congressional action is taken. On January 2, 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, or the ATRA, which, among other things, further reduced Medicare payments to several providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws may result in additional reductions in Medicare and other health care funding, which could have a material adverse effect on our future customers and accordingly, our financial operations.

International Regulation

In addition to regulations in the United States, we, or our collaborators, will be subject to a variety of foreign regulations governing clinical trials and commercial sales and distribution of our future drugs. Whether or not we obtain FDA approval for a drug, we or our collaborators must obtain approval of the drug by the comparable regulatory authorities of foreign countries before commencing clinical trials or marketing of the drug in those countries. The approval process varies from country to country and the time may be longer or shorter than that required for FDA approval. The requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary greatly from country to country.

Under European Union regulatory systems, marketing authorizations may be submitted either under a centralized, decentralized or mutual recognition procedure. The centralized procedure provides for the grant of a single marking authorization that is valid for all European Union member states. The decentralized procedure includes selecting one "reference member state," or RMS, and submitting to more than one member state at the same time. The RMS National Competing Authority conducts a detailed review and prepares an assessment report, to which concerned member states provide comment. The mutual recognition procedure provides for mutual recognition of national approval decisions. Under this procedure, the holder of a national marking authorization may submit an application to the remaining member states post-initial approval. Within 90 days of receiving the applications and assessment report, each member state must decide whether to recognize approval.

In addition to regulations in Europe and the United States, we, or our collaborators, will be subject to a variety of foreign regulations governing clinical trials and commercial distribution of our future drugs.

Environmental Regulation

We are subject to numerous foreign, federal, state and local environmental, health and safety laws and regulations relating to, among other matters, safe working conditions, product stewardship and end-of-life handling or disposition of products, and environmental protection, including those governing the generation, storage, handling, use, transportation and disposal of hazardous or potentially hazardous materials. Some of these laws and regulations require us to obtain licenses or permits to conduct our operations. Environmental laws and regulations are complex, change frequently and have tended to become more stringent over time. Although the costs to comply with applicable laws and regulations, including requirements in the European Union relating to the restriction of use of hazardous substances in products, have not been material, we cannot predict the impact on our business of new or amended laws or regulations or any changes in the way existing and future laws and regulations are interpreted or enforced, nor can we ensure we will be able to obtain or maintain any required licenses or permits.

Employees

As of June 30, 2015, we had 24 full-time employees, of whom two have medical degrees and three have Ph.D. degrees. Of these full-time employees, 19 employees are engaged in research and development activities and five employees are engaged in business development, finance, human resources and general management. We have no collective bargaining agreements with our employees and we have not experienced any work stoppages. We consider our relations with our employees to be good.

Facilities and Services Agreement with Asuragen

Our corporate headquarters is located in Austin, Texas. In October 2014, we entered into a sublease agreement with Asuragen and amended an existing service agreement under which we share space with Asuragen and Asuragen provides certain services to us. These services include facilities-related services, warehouse services, shipping and receiving and other services. The facility we occupy as a part of this agreement encompasses approximately 10,280 square feet of office and laboratory space, the laboratory space of which we share with Asuragen. The term for the agreement expires in August 2016, but may be terminated earlier by either party with six months' notice. We believe that our facility is currently sufficient to meet our needs and that suitable additional or alternative space would be available to us when needed.

Strategic Partnerships and Collaborations

Asuragen, Inc.

In 2009, we in-licensed or acquired certain patents and applications relating to certain aspects of microRNA compounds, targets for microRNAs and methods of use of such compounds from our founding company, Asuragen, and entered into a cross license with Asuragen, under which Asuragen granted us an exclusive, fully sublicensable, fully paid-up, royalty-free, perpetual and irrevocable license in the field of therapeutics, under patents and applications retained by it relating to microRNAs and their uses. Asuragen retains all rights in the fields outside therapeutics under the patents and applications that it retained and licensed to us, and we have granted to Asuragen an exclusive (even as to us), fully sublicensable, royalty-free, perpetual and irrevocable license in the field of diagnostics under the patents and applications relating to microRNA that we solely own as a result of the

acquisition, while we retain all rights in therapeutics and all other fields outside diagnostics. Under our cross license agreement with Asuragen, as amended in 2012, we have the right to control the prosecution and maintenance of our owned patent families as well as certain patent families owned by Asuragen. Each party retains the right to enforce the patents that it owns against third parties, with the exception of certain foundational patents that are owned by Asuragen. Additionally, certain of these Asuragen patents are included within the patents licensed under our agreement with Yale, and are therefore subject to the terms of the February 2014 amended and restated agreement as described below in "*Strategic Partnerships and Collaborations—Yale University*."

Marina Biotech, Inc.

In December 2011, we entered into a license agreement with Marina Biotech, Inc., or Marina, pursuant to which Marina granted us an exclusive license under its proprietary liposomal delivery technology, NOV340, known under the brand name "SMARTICLES," to develop and commercialize drug products incorporating SMARTICLES in combination with our lead therapeutic product, MRX34, for the prevention and treatment of cancer and any other disease in humans and animals, with the exception of DNA interference human therapeutic use. Our license agreement with Marina has been amended twice. In December 2013, the license agreement was amended to modify certain payment obligations with respect to MRX34, and to include within the scope of our exclusive license three additional specific microRNAs selected by us, and in May 2015 we amended the license agreement to reduce the amount of a specific milestone payment and to provide for the prepayment of such milestone payment. We are required to use commercially reasonable efforts to commercialize licensed products in specified major markets, and in other markets where we consider it is commercially reasonable to do so. We are responsible, at our cost, for all development of manufacturing processes and scale-up for the licensed technology in connection with our licensed products.

We have paid Marina approximately $2.1 million in the aggregate to date in up-front and milestone payments (including the milestone prepayment under the May 2015 amendment) and as consideration for the inclusion within the license of the three additional compounds. As we progress development and commercialization of products covered by the license, we will be required to make payments to Marina based upon the achievement of certain development and regulatory milestones, totaling up to $6 million in the aggregate for each licensed product. We are also required to pay up to an additional $4 million per licensed product upon the achievement of certain regulatory milestones for a specified number of additional indications, leading to a maximum cap on all milestone payments of $10 million per product. The exception to this is for our lead therapeutic product, MRX34, where the aggregate of all remaining development and regulatory milestone payments due to Marina, including for all additional indications, is $3.7 million. In addition to milestone payments, we will be required to pay low single digit royalties on net sales of licensed products other than MRX34, subject to customary reductions and offsets. As a result of our 2013 amendment to our agreement with Marina, we are no longer required to pay a royalty to Marina with respect to sales of our lead therapeutic product, MRX34. For licensed products other than MRX34, our obligation to pay royalties to Marina will expire on a country-by-country and licensed product-by-licensed product basis upon the later of the expiration of all patents covering such licensed product in such country, or 10 years from the first commercial sale of such product in such country. If we sublicense the rights granted to us under the Marina license, we are required to pay a portion of any revenue we receive from such sublicensees at a tiered percentage between the very low single digits and the mid-teens, depending on the circumstances in which the sublicense is entered into.

We may terminate our agreement with Marina for any reason by giving 60 days' notice to Marina. Either party may terminate the agreement upon the insolvency of the other party or upon 90 days' notice to the other party for the uncured material breach of the agreement, with the exception of non-payment which permits Marina to terminate the agreement upon 30 days' notice to us. Absent

earlier termination, our agreement with Marina will remain in force on a licensed product-by-licensed product and country-by-country basis until the earlier of the expiration of our obligation to pay royalties with respect to such licensed product in such country, or the end of the calendar quarter in which sales of a generic version of such licensed product exceed a specified proportion of the aggregate sales of such licensed product in such country.

Yale University

In 2006, Asuragen entered into an exclusive license agreement with Yale that granted to Asuragen an exclusive, worldwide, fully sublicenseable license for all human therapeutic and diagnostic uses under certain patent rights relating to microRNAs arising from the laboratory of Dr. Frank Slack at Yale. This agreement was assigned to us by Asuragen in connection with our acquisition of certain assets, including patent rights, in 2009. In addition, some of the patent filings in our intellectual property portfolio that are licensed to us by Asuragen are also included in the patents licensed under the Yale agreement as a result of previous discussions between the parties about possible co-ownership with Yale of these patents. The patents that are subject to both the Yale and Asuragen licenses cover certain aspects relating to the composition and method of use of specified microRNA mimics, including MRX34 and let-7, while those patent families that are solely subject to our license from Yale cover certain uses of let-7. In February 2014, we amended and restated our agreement with Yale to modify, among other things, the procedure for determining the inventorship of such patents and applications. Following this amendment, an independent third party expert was engaged to determine the inventorship, and hence the ownership, of the patents and applications potentially subject to Yale and Asuragen co-ownership. This determination confirmed each party's sole ownership of each patent where co-ownership had been under consideration, and resulted in a correction to one pending application to remove Dr. Slack as a co-inventor. Notwithstanding the expert's determination of inventorship, in accordance with the terms of our license agreement with Yale, these patents and applications will remain licensed patents under the agreement, and subject to all the terms of our license agreement with Yale. Upon commercialization of any products covered by the licensed patents, our financial obligations to Yale, if any, will depend on the particular product and Yale's ownership rights in any patents covering such product.

We are required to use reasonable commercial efforts with respect to development and commercialization of products covered by our license agreement with Yale and to fulfill certain specified development and regulatory diligence criteria, or achieve specified development milestones by specified dates, in some cases subject to an extension upon payment of certain fees, for products covered by the agreement.

We will be required to pay royalties to Yale on net sales of licensed products that contain specified microRNAs, including MRX34 and products containing let-7, at a percentage ranging from the very low to the low single digits, subject to customary reductions and offsets. Our obligation to pay royalties to Yale will expire on a licensed product-by-licensed product and country-by-country basis upon the earlier of the expiration of the last valid claim of a licensed patent covering such licensed product or the launch of a generic version of such product in such country that has been approved by the applicable regulatory authority in such country. We will also be required to pay to Yale a portion of specified gross revenue that we receive from our sublicensees at percentages ranging from the mid-single digits up to the very low twenties, depending on the particular product and Yale's ownership rights, if any, in the patents covering such product.

We will also be required to make payments for achievement of certain development and regulatory milestones by products containing one specified microRNA and covered by the licensed patents of up to $600,000 in the aggregate for each such product, subject to reduction in certain circumstances. In addition, we are required to pay an annual license maintenance fee and minimum annual royalties under certain circumstances.

We have the right to terminate our agreement with Yale for any reason upon three months' written notice to Yale, and either party may terminate the agreement on 60 days' notice for the uncured material breach of the other party. Yale may terminate our agreement, on a licensed product miRNA category-by-licensed product miRNA category basis, if we fail to meet specified diligence obligations within specified time periods, subject to our right to extend such periods with respect to one such product by making specified extension payments and to renegotiate such time periods under certain circumstances with respect to the other two products. Yale may also terminate our agreement in its entirety immediately upon notice to us if we fail to maintain adequate insurance or become insolvent. In the event that our license agreement with Yale is terminated, we would lose our rights under any licensed patents that are solely owned by Yale. Absent earlier termination, our agreement with Yale will remain in force on a country-by-country basis until the expiration of the last valid claim of the licensed patents, whether owned by us or by Yale.

University of Zurich

In March 2013, we entered into an exclusive, worldwide, royalty-bearing license, with the right to grant sublicenses, with the University of Zurich under certain patent rights relating to the treatment of certain types of B-cell lymphoma with microRNA mimics, in the fields of therapeutics and diagnostics. We are required to pay an annual license maintenance fee, and upon commercialization of any products covered by the licensed patent rights, we will be required to pay the University of Zurich a royalty on net sales of products covered by the licensed patents by us, our affiliates or sublicensees in the very low single digits, and a portion of other fees received from any sublicensees at a percentage in the mid-teens. We are required to use commercially reasonable efforts to develop, manufacture, sell and market licensed products. If we fail to comply with our diligence obligations, then under certain circumstances, the University of Zurich may terminate our agreement immediately upon notice to us.

We have the right to terminate our agreement with the University of Zurich for any reason upon six months' prior notice. The University of Zurich may terminate our agreement immediately upon notice to us in certain circumstances if we fail to meet our diligence obligations. The University of Zurich may also terminate the agreement upon 60 days' written notice to us in the event of our uncured material breach of the agreement, or immediately upon notice to us in the event of our insolvency or if we challenge or assist any third party to challenge the validity of the licensed patents.

CPRIT

In August 2010, we entered into a grant contract with the Cancer Prevention and Research Institute of Texas, or CPRIT, under which we received a $10.3 million commercialization award from the State of Texas through CPRIT. CPRIT was established to expedite innovation and commercialization in the area of cancer research and to enhance access to evidence-based prevention programs and services throughout the State of Texas. The award was a three-year award that was funded annually, and the contract terminated on January 31, 2014, subject to our obligations to make certain payments that survive termination. Under the terms of the award, we will be required to pay to CPRIT a portion of our revenues from sales of certain products by us, including sales of MRX34, or received from our licensees or sublicensees, at a percentage in the low single digits until the aggregate amount of such payments equals a specified multiple of the grant amount, and thereafter at a rate of less than one percent, subject to our right, under certain circumstances, to make a one-time payment in a specified amount to CPRIT to buy out such payment obligations. We will also be required to repay CPRIT the total amount of the grant proceeds under certain circumstances of relocation of our principal place of business outside Texas during a specified period following the final payment of grant funding to us.

Polymun Scientific Immunbiologische Forschung GmbH

In November 2012, we entered into a supply agreement with Polymun for the formulation, manufacture and supply of a liposomal formulation of finished drug product for our lead product candidate, MRX34, utilizing the NOV340 SMARTICLES technology licensed to us by Marina in conjunction with Polymun's proprietary technology relating to the production of liposomal formulations, for use by us in our clinical trials for MRX34. The agreement contains terms and conditions generally consistent with an agreement for manufacture and supply of a pharmaceutical product for clinical purposes, including with respect to supply of product in accordance with specifications and quality assurance and quality control activities. We have also entered into a separate quality agreement with Polymun governing all supply of product under the agreement. Under our agreement with Polymun, we retain all intellectual property rights arising as a result of the activities under the agreement, subject to certain limited exceptions relating to Polymun's proprietary technology. The agreement remains in force until completion of the activities set forth under any statements of work executed under the agreement, unless earlier terminated by either party. Either we or Polymun may terminate the agreement on 30 days' written notice in the event of the other party's uncured material breach or insolvency.

Legal Proceedings

From time to time, we are subject to various legal proceedings, claims and administrative proceedings that arise in the ordinary course of our business activities. Although the results of litigation and claims cannot be predicted with certainty, as of the date of this prospectus, we do not believe we are party to any claim, proceeding or litigation the outcome of which, if determined adversely to us, would individually or in the aggregate be reasonably expected to have a material adverse effect on our business. Regardless of the outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors.

Management

Executive Officers and Directors

The following table sets forth information regarding our executive officers and directors, as of June 30, 2015:

Name	Age	Position(s)
Executive Officers		
Paul Lammers, M.D., M.Sc.	58	Director, President and Chief Executive Officer
Jon Irvin	57	Chief Financial Officer
Sinil Kim, M.D.	59	Chief Medical Officer and Vice President of Oncology
Casi DeYoung	44	Chief Business Officer
Non-Employee Directors		
Michael Powell, Ph.D.(2)	60	Chairman of the Board
Elaine V. Jones, Ph.D.(1)	60	Director
Edward Mathers(2)	55	Director
Matthew Winkler, Ph.D.(1)	63	Director
Lawrence M. Alleva(1)	65	Director
Clay B. Siegall, Ph.D.(2)	54	Director

(1) Member of the audit committee.

(2) Member of the compensation committee.

Executive Officers

Paul Lammers, M.D., M.Sc. Dr. Paul Lammers has served as a member of our board of directors and as our President and Chief Executive Officer since November 2009. Previously, Dr. Lammers was the President of Repros Therapeutics Inc., or Repros Therapeutics, a biopharmaceutical company, from February 2009 until October 2009. From August 2002 until September 2008, Dr. Lammers served as the Chief Medical Officer for EMD Serono, Inc., a biopharmaceutical division of Merck KGaA, a global pharmaceutical and chemical group. Previously, Dr. Lammers served as the Senior Vice President of clinical and regulatory affairs at Zonagen, Inc., which later became Repros Therapeutics. Dr. Lammers began his career with Organon International, a pharmaceutical company, spending eight years in the commercial and clinical operations in Europe and the United States. Dr. Lammers received a M.Sc. and M.D. from the Catholic University (Radboud University) in Nijmegen, The Netherlands. Dr. Lammers has been chosen to serve on our board of directors due to his management experience in multiple pharmaceutical and biopharmaceutical companies and drug development.

Jon Irvin. Mr. Jon Irvin has served as our Chief Financial Officer since November 2012, first as a Chief Financial Officer Consultant with Bridgepoint Consulting, LLC, or Bridgepoint, a consulting firm providing financial consulting assistance to various organizations, and then as our employee beginning in April 2013. Mr. Irvin was a Chief Financial Officer Consultant with Bridgepoint from March 2012 to June 2013. From December 2010 to March 2012, Mr. Irvin was an independent consultant in Austin, Texas. From September 2005 to December 2010, Mr. Irvin served as the Chief Executive Officer and Vice President of Finance for Voxpath Networks, Inc., a telecommunications and intellectual property company. Previously, Mr. Irvin held various finance positions at Reddwerks Corporation, a software company, Esoterix, Inc., a medical labs company, Topaz Technologies, a pharmaceutical software company, and BioNumerik Pharmaceuticals, Inc., a pharmaceutical company. Mr. Irvin was previously an accountant with Price Waterhouse and Ernst & Young. Mr. Irvin received a B.S. in Accounting from the University of Illinois.

Sinil Kim, M.D. Dr. Sinil Kim has served as our Chief Medical Officer and Vice President of Oncology since May 2013. Previously, Dr. Kim served as a Senior Director and Global Clinical Leader at Pfizer, Inc., a global pharmaceutical company, from May 2005 until May 2013. Dr. Kim served as a Director of Clinical Oncology with Bristol-Myers Squibb, a global pharmaceutical company, from September 2002 to May 2005. Dr. Kim co-founded DepoTech Corp, a pharmaceutical company, in 1989. Dr. Kim received a B.S. in Chemistry and M.D. from the University of Washington and completed his post-doctoral fellowship in hematology and oncology at the University of California, San Diego.

Casi DeYoung. Ms. Casi DeYoung has served as our Chief Business Officer since March 2014. From May 2008 to December 2013, Ms. DeYoung served as the Vice President of Business Development for Reata Pharmaceuticals, Inc., a biopharmaceutical company. Previously, Ms. DeYoung served as the Vice President of Business Development for ODC Therapy, Inc., an immunotherapy company. From 2000 to 2005, Ms. DeYoung served in various roles, including the Director of Global Oncology Operations, for EMD Pharmaceuticals, Inc., the U.S. affiliate of Merk KGaA, a global healthcare company. Ms. DeYoung received a B.S. in Chemistry from Southwestern University and an M.B.A. from the University of Texas at Austin.

Board Composition

Michael Powell, Ph.D. Dr. Michael Powell has served as Chairman of our board of directors since October 2012. Since 1997, Dr. Powell has been a General Partner of Sofinnova Ventures, a venture capital firm. Previously, Dr. Powell has held positions at Genentech, Inc., a biotechnology company, Cytel Inc., a research and development company, and Syntex Research Group, a pharmaceutical company. Dr. Powell is currently a director of Dauntless Pharmaceuticals, Inc., a biopharmaceutical company, Alvine Pharmaceuticals, Inc., a biopharmaceutical company, Ascenta Therapeutics, Inc., a biopharmaceutical company, Catalyst Biosciences, Inc., a biopharmaceutical company, and Ocera Therapeutics, Inc., a publicly traded biopharmaceutical company. Dr. Powell is an Adjunct Professor at the University of Kansas. Dr. Powell is the Board President of the AIDS Vaccine Advocacy Coalition and serves on the advisory board of the Institute for the Advancement of Medical Innovation at the University of Kansas. Dr. Powell received a B.S. in Chemistry from Scarborough College, a Ph.D. in Physical Chemistry from the University of Toronto and completed his post-doctorate work in Bioorganic Chemistry at the University of California. Dr. Powell has been chosen to serve on our board of directors due to his experience with the life sciences and pharmaceutical industries and the venture capital industry.

Elaine V. Jones, Ph.D. Dr. Elaine V. Jones has served as a member of our board of directors since October 2012. Since December 2008, Dr. Jones has served as Executive Director, Venture Capital of Pfizer Venture Investments, the venture capital arm of Pfizer, Inc., a global pharmaceutical company. Dr. Jones served as a director of Aquinox Pharmaceuticals, Inc., a publicly-traded pharmaceutical company, from June 2010 to February 2015, and also served as the chair of the audit committee. Dr. Jones also served as a director of Flexion Therapeutics, Inc., a pharmaceutical company from September 2009 to June 2014. Dr. Jones is currently a director of Autifony Therapeutics Ltd., a biotechnology company, and Mission Therapeutics Ltd., a biopharmaceutical company. From 2003 to November 2008, Dr. Jones served as a general partner of Euclid SR Partners, a venture capital firm. From 1999 to 2003, Dr. Jones held various positions at S.R. One, the venture fund of GlaxoSmithKline plc, a global pharmaceutical company. Dr. Jones received a B.S. in Biology from Juniata College and a Ph.D. in Microbiology from the University of Pittsburgh. Dr. Jones has been chosen to serve on our board of directors due to her experience with the life sciences and pharmaceutical industries, pharmaceutical science and the venture capital industry.

Edward Mathers. Mr. Ed Mathers has served as a member of our board of directors since October 2012. Since August 2008, Mr. Mathers has been a Partner at New Enterprise Associates, Inc., or NEA, a private venture capital firm focusing on technology and healthcare investments. Mr. Mathers serves on the board of directors of Envisia Therapeutics, Inc., a biopharmaceutical company, Liquidia Technologies, a biotechnology company, Ra Pharmaceuticals, Inc., a pharmaceutical company, Rhythm Pharmaceuticals, a pharmaceutical company, and Lumos Pharma, a biotechnology company. From 2002 to 2008, Mr. Mathers served as Executive Vice President, Corporate Development and Venture at MedImmune, Inc., or MedImmune, and led its venture capital subsidiary, MedImmune Ventures, Inc. Before joining MedImmune in 2002, he was Vice President, Marketing and Corporate Licensing and Acquisitions at Inhale Therapeutic Systems. Previously, Mr. Mathers spent 15 years at Glaxo Wellcome, Inc. where he held various sales and marketing positions. Mr. Mathers received a B.S. in Chemistry from North Carolina State University. Mr. Mathers has been chosen to serve on our board of directors due to his experience with the healthcare and pharmaceutical industries and his broad management experience.

Matthew Winkler, Ph.D. Dr. Matthew Winkler has served as a member of our board of directors since December 2007. Since January 2013, Dr. Winkler has been the Chairman of the board of directors and the Chief Scientific Officer of Asuragen, Inc., or Asuragen, a molecular diagnostic and pharmacogenomics service company, where he also served as the Chief Executive Officer from March 2006 to December 2012. Prior to Asuragen, Dr. Winkler was the founder and Chief Executive Officer of Ambion, Inc., a privately held company that developed and sold research reagents for RNA analysis. Since June 2010, Dr. Winkler has served on the board of Second Genome, a biotherapeutics company. Dr. Winkler received a B.S. in Genetics and a Ph.D. in Zoology from the University of California at Berkeley. Dr. Winkler has been chosen to serve on our board of directors due to his management experience in the life sciences and pharmaceutical industries.

Lawrence M. Alleva. Mr. Lawrence M. Alleva joined our board in July 2014. Prior to his retirement in June 2010, Mr. Alleva worked with PricewaterhouseCoopers LLP, or PwC, for 39 years, 28 of which as a partner with the firm. Mr. Alleva served clients primarily in the technology sector, including numerous pharmaceutical and biotechnology companies. Additionally, he served PwC in a variety of office, regional and national practice leadership roles, most recently as the U.S. Ethics and Compliance Leader (Assurance) for PwC from 2006 until his retirement. Mr. Alleva is a Certified Public Accountant (inactive). Mr. Alleva received a Bachelor of Science degree from Ithaca College (magna cum laude) and attended Columbia University's Executive MBA program. Mr. Alleva also serves as a director for public companies Tesaro Inc. and Bright Horizons Family Solutions, and previously served on the board of GlobalLogic Inc. Mr. Alleva has been chosen to serve on our board of directors due to his financial and accounting experience as a director and a public accounting partner serving multiple healthcare, pharmaceutical and biopharmaceutical companies.

Clay B. Siegall, Ph.D. Dr. Clay B. Siegall has served a member of our board of directors since January 2013. Dr. Siegall founded Seattle Genetics, Inc., or Seattle Genetics, a biotechnology company, in 1997, where he has served as the Chief Executive Officer since November 2002, as the President since June 2000 and as the Chairman of the board of directors since March 2004. Dr. Siegall also served as the Chief Scientific Officer of Seattle Genetics from December 1997 until November 2002. Dr. Siegall currently serves on the board of directors of Alder BioPharmaceuticals, Inc., a biopharmaceutical company, and Ultragenyx Pharmaceutical, a pharmaceutical company. Prior to co-founding Seattle Genetics, Dr. Siegall was with the Bristol-Myers Squibb Pharmaceutical Research Institute from 1991 to 1997, most recently as a Principal Scientist. From 1988 to 1991, Dr. Siegall was a Staff Fellow/Biotechnology Fellow at the National Cancer Institute, National Institutes of Health. Dr. Siegall received a B.S. in Zoology from the University of Maryland and a Ph.D. in Genetics from George Washington University. Dr. Siegall has been chosen to serve on our board of directors due to his experience as a director and executive of multiple healthcare and biopharmaceutical companies.

Director Independence

Our board of directors currently consists of seven members. Our board of directors has determined that of our directors, other than Dr. Paul Lammers, qualify as "independent" directors in accordance with the NASDAQ listing requirements. Dr. Lammers is not considered independent because he is an employee of Mirna. The NASDAQ independence definition includes a series of objective tests, such as that the director is not, and has not been for at least three years, one of our employees and that neither the director nor any of his family members has engaged in various types of business dealings with us. In addition, as required by NASDAQ rules, our board of directors has made a subjective determination as to each independent director that no relationships exist, which, in the opinion of our board of directors, would interfere with the exercise of independent judgment in carrying out the responsibilities of a director. In making these determinations, our board of directors reviewed and discussed information provided by the directors and us with regard to each director's business and personal activities and relationships as they may relate to us and our management. There are no family relationships among any of our directors or executive officers.

Classified Board of Directors

In accordance with our amended and restated certificate of incorporation to be in effect immediately prior to the consummation of this offering, our board of directors will be divided into three classes with staggered, three-year terms. At each annual meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the time of election and qualification until the third annual meeting following election. Effective upon the consummation of this offering, our directors will be divided among the three classes as follows:

- the Class I directors will be , and , and their terms will expire at the annual meeting of stockholders to be held in 2016;
- the Class II directors will be , and , and their terms will expire at the annual meeting of stockholders to be held in 2017; and
- the Class III directors will be , and , and their terms will expire at the annual meeting of stockholders to be held in 2018.

Our amended and restated certificate of incorporation will provide that the authorized number of directors may be changed only by resolution of the board of directors. Any additional directorships resulting from an increase in the number of directors will be distributed among the three classes so that, as nearly as possible, each class will consist of one-third of the directors. The division of our board of directors into three classes with staggered three- year terms may delay or prevent a change of our management or a change in control of our company.

Voting Arrangements

Pursuant to an amended and restated voting agreement, as amended, that we entered into with certain holders of our common stock and certain holders of our convertible preferred stock:

- Sofinnova Venture Partners VIII, L.P. (or any of its affiliates), collectively, Sofinnova, has the right to designate a director for election to our board of directors and has designated Dr. Powell as such director;
- New Enterprise Associates 14, L.P. and NEA Ventures 2012, Limited Partnerships (or any of its affiliates), collectively, NEA, has the right to designate a director for election to our board of directors and has designated Mr. Mathers as such director;
- Pfizer Inc. (or any of its affiliates), collectively, Pfizer, has the right to designate a director for election to our board of directors and has designated Dr. Jones as such director;

- the holders of a majority of the outstanding shares of our Series B convertible preferred stock and Series A convertible preferred stock, voting as a single class on an as-converted basis, have the right to designate a director for election to our board of directors and have designated Dr. Winkler as such director;

- our then-incumbent Chief Executive Officer has the right to be nominated to serve on our board of directors; and

- three directors, who shall not be affiliated with us or a holder of 3,000,000 shares of our convertible preferred stock, will be elected by the holders of a majority of the outstanding shares of our common and convertible preferred stock, voting together as a single class on an as-converted basis, and approved by the directors designated by Sofinnova, NEA and Pfizer, who have approved Mr. Alleva and Dr. Siegall as such directors.

The holders of our common stock and convertible preferred stock who are parties to the amended and restated voting agreement, as amended, are obligated to vote for such designees. The provisions of this voting agreement will terminate upon the consummation of this offering and there will be no further contractual obligations regarding the election of our directors. Our directors hold office until their successors have been elected and qualified or appointed, or the earlier of their death, resignation or removal.

Leadership Structure of the Board

Our board of directors has separated the positions of Chairman of the board and Chief Executive Officer. Separating these positions allows our Chief Executive Officer to focus on our day-to-day business, while allowing the Chairman of the board to lead the board in its fundamental role of providing advice to and independent oversight of management. The board recognizes the time, effort and energy that the Chief Executive Officer is required to devote to his position in the current business environment, as well as the commitment required to serve as Chairman of the board, particularly as the board's oversight responsibilities continue to grow. While our bylaws and corporate governance guidelines do not require that our Chairman and Chief Executive Officer positions be separate, the board believes that having separate positions and having an independent outside director serve as Chairman is the appropriate leadership structure for the Company and demonstrates our commitment to good corporate governance. However, our board of directors will continue to periodically review our leadership structure and may make such changes in the future as it deems appropriate.

Role of Board in Risk Oversight Process

Risk assessment and oversight are an integral part of our governance and management processes. Our board of directors encourages management to promote a culture that incorporates risk management into our corporate strategy and day-to-day business operations. Management discusses strategic and operational risks at regular management meetings, and conducts specific strategic planning and review sessions during the year that include a focused discussion and analysis of the risks facing us. Throughout the year, senior management reviews these risks with the board of directors at regular board meetings as part of management presentations that focus on particular business functions, operations or strategies, and presents the steps taken by management to mitigate or eliminate such risks.

Our board of directors does not have a standing risk management committee, but rather administers this oversight function directly through our board of directors as a whole, as well as through various standing committees of our board of directors that address risks inherent in their respective areas of oversight. In particular, our board of directors is responsible for monitoring and assessing strategic risk exposure, our audit committee is responsible for overseeing our major financial risk exposures and the steps our management has taken to monitor and control these exposures. The

audit committee also monitors compliance with legal and regulatory requirements. Our nominating and governance committee monitors the effectiveness of our corporate governance guidelines and considers and approves or disapproves any related-persons transactions. Our compensation committee assesses and monitors whether any of our compensation policies and programs has the potential to encourage excessive risk-taking.

Board Committees

Audit Committee

Our audit committee oversees our corporate accounting and financial reporting process. Among other matters, the audit committee:

- appoints our independent registered public accounting firm;
- evaluates the independent registered public accounting firm's qualifications, independence and performance;
- determines the engagement of the independent registered public accounting firm;
- reviews and approves the scope of the annual audit and the audit fee;
- discusses with management and the independent registered public accounting firm the results of the annual audit and the review of our quarterly financial statements;
- approves the retention of the independent registered public accounting firm to perform any proposed permissible non-audit services;
- monitors the rotation of partners of the independent registered public accounting firm on our engagement team as required by law;
- is responsible for reviewing our financial statements and our management's discussion and analysis of financial condition and results of operations to be included in our annual and quarterly reports to be filed with the SEC;
- reviews our critical accounting policies and estimates; and
- annually reviews the audit committee charter and the committee's performance.

The current members of our audit committee are , , and . serves as the chairperson of the committee. All members of our audit committee meet the requirements for financial literacy under the applicable rules and regulations of the SEC and NASDAQ. Our board of directors has determined that is an audit committee financial expert as defined under the applicable rules of the SEC and has the requisite financial sophistication as defined under the applicable rules and regulations of NASDAQ. Under the rules of the SEC, members of the audit committee must also meet heightened independence standards. However, a minority of the members of the audit committee may be exempt from the heightened audit committee independence standards for one year from the date of effectiveness of the registration statement of which this prospectus forms a part. Our board of directors has determined that each of , and are independent under the applicable rules of NASDAQ. The audit committee operates under a written charter that satisfies the applicable standards of the SEC and NASDAQ.

Compensation Committee

Our compensation committee reviews and recommends policies relating to compensation and benefits of our officers and employees. The compensation committee reviews and recommends corporate goals and objectives relevant to compensation of our Chief Executive Officer and other

executive officers, evaluates the performance of these officers in light of those goals and objectives and recommends to our board of directors the compensation of these officers based on such evaluations. The compensation committee also recommends to our board of directors the issuance of stock options and other awards under our stock plans. The compensation committee will review and evaluate, at least annually, the performance of the compensation committee and its members, including compliance by the compensation committee with its charter. The current members of our compensation committee are , and . serves as the chairperson of the committee. Each of the members of our compensation committee is independent under the applicable rules and regulations of NASDAQ, is a "non-employee director" as defined in Rule 16b-3 promulgated under the Exchange Act and is an "outside director" as that term is defined in Section 162(m) of the U.S. Internal Revenue Code of 1986, as amended, or Section 162(m). The compensation committee operates under a written charter.

Nominating and Corporate Governance Committee

The nominating and corporate governance committee is responsible for making recommendations to our board of directors regarding candidates for directorships and the size and composition of our board of directors. In addition, the nominating and corporate governance committee is responsible for overseeing our corporate governance policies and reporting and making recommendations to our board of directors concerning governance matters. The current members of our nominating and corporate governance committee are , and . serves as the chairman of the committee. Each of the members of our nominating and corporate governance committee is an independent director under the applicable rules and regulations of NASDAQ relating to nominating and corporate governance committee independence. The nominating and corporate governance committee operates under a written charter.

Compensation Committee Interlocks and Insider Participation

During 2014, each of Michael Powell, Ph.D., Edward Mathers, and Clay Siegall, Ph.D. served as members of our compensation committee. During 2014, none of the members of our compensation committee has at any time been one of our officers or employees. None of our executive officers currently serves, or in the past year has served, as a member of the board of directors or compensation committee of any entity that has one or more executive officers on our board of directors or compensation committee.

Board Diversity

Upon consummation of this offering, our nominating and corporate governance committee will be responsible for reviewing with the board of directors, on an annual basis, the appropriate characteristics, skills and experience required for the board of directors as a whole and its individual members. In evaluating the suitability of individual candidates (both new candidates and current members), the nominating and corporate governance committee, in recommending candidates for election, and the board of directors, in approving (and, in the case of vacancies, appointing) such candidates, will take into account many factors, including the following:

- personal and professional integrity;
- ethics and values;
- experience in corporate management, such as serving as an officer or former officer of a publicly held company;
- experience in the industries in which we compete;
- experience as a board member or executive officer of another publicly held company;

- diversity of expertise and experience in substantive matters pertaining to our business relative to other board members;
- conflicts of interest; and
- practical and mature business judgment.

Currently, our board of directors evaluates, and following the consummation of this offering will continue to evaluate, each individual in the context of the board of directors as a whole, with the objective of assembling a group that can best maximize the success of the business and represent stockholder interests through the exercise of sound judgment using its diversity of experience in these various areas.

Code of Business Conduct and Ethics

We have adopted a code of business conduct and ethics that applies to all of our employees, officers and directors, including those officers responsible for financial reporting. Following the consummation of this offering, the code of business conduct and ethics will be available on our website at www.mirnarx.com. We expect that any amendments to the code, or any waivers of its requirements, will be disclosed on our website. The reference to our web address does not constitute incorporation by reference of the information contained at or available through our website.

Limitation on Liability and Indemnification Matters

Our amended and restated certificate of incorporation, which will become effective immediately prior to the consummation of this offering, or our amended and restated certificate of incorporation, contains provisions that limit the liability of our directors for monetary damages to the fullest extent permitted by Delaware law. Consequently, our directors will not be personally liable to us or our stockholders for monetary damages for any breach of fiduciary duties as directors, except liability for:

- any breach of the director's duty of loyalty to us or our stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- unlawful payments of dividends or unlawful stock repurchases or redemptions as provided in Section 174 of the Delaware General Corporation Law; or
- any transaction from which the director derived an improper personal benefit.

Our amended and restated certificate of incorporation and amended and restated bylaws, which will become effective immediately prior to the consummation of this offering, or our amended and restated bylaws, provide that we are required to indemnify our directors and officers, in each case to the fullest extent permitted by Delaware law. Our amended and restated bylaws also provide that we are obligated to advance expenses incurred by a director or officer in advance of the final disposition of any action or proceeding, and permit us to secure insurance on behalf of any officer, director, employee or other agent for any liability arising out of his or her actions in that capacity regardless of whether we would otherwise be permitted to indemnify him or her under Delaware law.

In addition to the indemnification required in our amended and restated certificate of incorporation and amended and restated bylaws, we have entered or intend to enter into indemnification agreements with each of our directors, officers and certain employees before the completion of this offering. These agreements will provide for the indemnification of our directors, officers and certain employees for all reasonable expenses and liabilities incurred in connection with any action or proceeding brought against them by reason of the fact that they are or were our agents. We believe that these provisions in our amended and restated certificate of incorporation and amended

and restated bylaws and indemnification agreements are necessary to attract and retain qualified persons as directors and officers. This description of the limitation of liability and indemnification provisions of our amended and restated certificate of incorporation, of our amended and restated bylaws and of our indemnification agreements is qualified in its entirety by reference to these documents, each of which is attached as an exhibit to this registration statement, of which this prospectus is a part.

The limitation of liability and indemnification provisions in our amended and restated certificate of incorporation and amended and restated bylaws may discourage stockholders from bringing a lawsuit against directors for breach of their fiduciary duties. They may also reduce the likelihood of derivative litigation against directors and officers, even though an action, if successful, might benefit us and our stockholders. A stockholder's investment may be harmed to the extent we pay the costs of settlement and damage awards against directors and officers pursuant to these indemnification provisions. Insofar as indemnification for liabilities arising under the Securities Act may be permitted to our directors, officers and controlling persons pursuant to the foregoing provisions, or otherwise, we have been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. There is no pending litigation or proceeding naming any of our directors or officers as to which indemnification is being sought, nor are we aware of any pending or threatened litigation that may result in claims for indemnification by any director or officer.

Director Compensation

While we did not maintain a formal policy, during fiscal year 2014, our independent directors, who we considered to be those non-employee directors not associated with a principal investor in our company, received an annual cash retainer of $25,000 for service as a director, pro-rated for partial years of service, and an additional cash retainer of $3,000 per meeting of the board or a committee of the board attended in person and $2,000 per meeting of the board or committee of the board attended telephonically. In addition, during fiscal year 2014, our board of directors granted options to purchase shares of our common stock to each independent director. In March 2014, Dr. Siegall was granted options to purchase an aggregate of 173,314 shares of our common stock and Dr. Goodman was granted options to purchase an aggregate of 153,504 shares of our common stock. In November 2014, Mr. Alleva was granted an option to purchase 200,000 shares of our common stock. Each option grant made to our independent directors was immediately vested and exercisable with respect to 20% of the shares underlying the option and the remaining shares vest and become exercisable in substantially equal installments every six months over four years, subject to continued service. In the event of a change of control (as defined in our 2008 Long term Incentive Plan, as amended, or the 2008 Stock Plan) while an independent director is still providing services to us, the options held by the independent director will become fully vested and exercisable immediately prior to such change in control.

We reimburse all of our non-employee directors for all reasonable and customary business expenses incurred providing services to us in accordance with Company policy.

In connection with this offering, we intend to approve and implement a compensation program for our non-employee directors that consists of annual retainer fees and initial and annual long-term equity awards.

2014 Director Compensation Table

The following table sets forth information for the year ended December 31, 2014 regarding the compensation awarded to, earned by or paid to our non-employee directors:

Name(1)	Fees Earned or Paid in Cash ($)	Option Awards ($)(1)(2)	All Other Compensation ($)	Total($)
Michael Powell, Ph.D.	$ —	$ —	$ —	$ —
Elaine V. Jones, Ph.D.	—	—	—	—
Edward Mathers	—	—	—	—
Matthew Winkler, Ph.D.	—	—	—	—
Lawrence M. Alleva(3)	15,417	69,553		84,970
Clay B. Siegall, Ph.D.	46,000	61,810	—	107,810
Corey Goodman, Ph.D.(4)	47,000	54,754	—	101,754

(1) The amounts reported in the Option Awards column represent the grant date fair value of the stock options granted to the non-employee members of our board of directors during 2014 as computed in accordance with ASC Topic 718, excluding the impact of estimated forfeitures related to service-based vesting provisions. The assumptions used in calculating the grant date fair value of the stock options reported in the Option Awards column are set forth in Note 2 to the audited financial statements included in this prospectus. Note that the amounts reported in this column reflect the accounting cost for these stock options, and do not correspond to the actual economic value that may be received by the non-employee members of our board of directors from the options.

(2) As of December 31, 2014, Mr. Alleva held an option to purchase an aggregate of 200,000 shares of our common stock, and Dr. Siegall held options to purchase an aggregate of 423,314 shares of our common stock; no other non-employee director held outstanding options to purchase our common stock as of December 31, 2014.

(3) Mr. Alleva joined our board of directors in July 2014.

(4) Dr. Goodman resigned from our board of directors effective July 10, 2015.

Executive Compensation

The following is a discussion and analysis of compensation arrangements of our named executive officers, or NEOs. This discussion contains forward looking statements that are based on our current plans, considerations, expectations and determinations regarding future compensation programs. Actual compensation programs that we adopt may differ materially from currently planned programs as summarized in this discussion. As an "emerging growth company" as defined in the JOBS Act, we are not required to include a Compensation Discussion and Analysis section and have elected to comply with the scaled disclosure requirements applicable to emerging growth companies.

We seek to ensure that the total compensation paid to our executive officers is reasonable and competitive. Compensation of our executives is structured around the achievement of individual performance and near-term corporate targets as well as long-term business objectives.

Our NEOs for fiscal year 2014 were as follows:

- Paul Lammers, M.D., M.Sc., President and Chief Executive Officer;
- Casi DeYoung, Chief Business Officer;
- Jon Irvin, Chief Financial Officer; and
- Sinil Kim, M.D., Vice President of Oncology and Chief Medical Officer.

2014 Summary Compensation Table

The following table shows information regarding the compensation of our named executive officers for services performed in the year ended December 31, 2014.

Name and Principal Position	Year	Salary ($)	Bonus ($)(1)	Option Awards ($)(2)	All Other Compensation ($)(3)	Total ($)
Paul Lammers, M.D., M.Sc. *President and Chief Executive Officer*	2014	$ 375,829	$ 0	$ 390,780	$ 11,275	$ 777,884
Casi DeYoung (4) *Chief Business Officer*	2014	224,712	25,000	266,353	3,288	519,353
Jon Irvin *Chief Financial Officer*	2014	204,240	0	76,338	8,170	288,798
Sinil Kim, M.D. *Chief Medical Officer and Vice President of Oncology*	2014	315,829	0	78,791	10,214	404,834

(1) The amount reported in the Bonus column represents the sign on bonus Ms. DeYoung received pursuant to her employment agreement in connection with commencing employment with us in March 2014. Please see the description of Ms. DeYoung's employment agreement with us in "Narrative to 2014 Summary Compensation Table and Outstanding Equity Awards at 2014 Fiscal Year End—Terms and Conditions of Employee Arrangements with our NEOs" below.

(2) For the option awards column, amounts shown represents the grant date fair value of stock options granted during fiscal year 2014 as calculated in accordance with ASC Topic 718, excluding the impact of estimated forfeitures related to service-based vesting provisions. See Note 2 to our audited financial statements included in this registration statement for the assumptions used in calculating this amount.

(3) The amounts reported in the All Other Compensation column represent 401(k) Plan matching contributions.

(4) Ms. DeYoung commenced employment with us in March 2014.

Outstanding Equity Awards at 2014 Fiscal Year End

The following table sets forth all outstanding equity awards held by each of the named executive officers as of December 31, 2014.

		Option Awards			
Name	Vesting Commencement Date(1)	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price ($)	Option Expiration Date
Paul Lammers, M.D., M.Sc.	11/4/2009	158,484	0	$ 0.50	12/31/2019
	1/10/2013(2)	1,194,744	548,438	0.11	1/22/2023
	3/6/2014	0	1,083,700	0.54	3/9/2024
Casi DeYoung	3/6/2014	0	738,644	0.54	3/9/2024
Jon Irvin	6/6/2013	84,375	140,625	0.11	6/5/2023
	6/6/2013	79,277	132,130	0.29	12/30/2023
	3/6/2014	0	211,700	0.54	3/9/2024
Sinil Kim, M.D.	6/6/2013	28,125	140,625	0.11	6/5/2023
	6/6/2013	28,125	140,625	0.29	12/30/2023
	3/6/2014	0	218,500	0.54	3/9/2024

(1) Except as otherwise noted, the shares subject to the options shall vest and become exercisable as to 1/4th of the shares subject to the option on the first anniversary of the vesting commencement date, and thereafter as to 1/48th of the shares subject to such option on each monthly anniversary of the vesting commencement date, such that all shares subject to the option will be vested on the fourth anniversary of the vesting commencement date, subject to the holder continuing to provide services to us through such vesting date.

(2) The shares subject to the option shall vest and become exercisable as to 1/4th of the shares subject to the option on the vesting commencement date, and thereafter as to 1/48th of the shares subject to such option on each monthly anniversary of the vesting commencement date, such that all shares subject to the option will be vested on the third anniversary of the vesting commencement date, subject to the holder continuing to provide services to us through such vesting date.

Narrative to 2014 Summary Compensation Table and Outstanding Equity Awards at 2014 Fiscal Year End

Terms and Conditions of Employee Arrangements with our NEOs

We have entered into agreements with each of the NEOs in connection with his or her employment with us. These agreements set forth the terms and conditions of employment of each named executive officer, including base salary, initial stock option grants, and standard employee benefit plan participation. Our board of directors or the compensation committee reviews each NEO's base salary from time to time to ensure compensation adequately reflects the NEO's qualifications, experience, role and responsibilities. For fiscal year 2014, Dr. Lammers' annual base salary was $376,335, Ms. DeYoung's base salary was $285,000, Dr. Kim's annual base salary was $316,200 and Mr. Irvin's annual base salary was $231,250. In addition, pursuant to her employment agreement, Ms. DeYoung was awarded a signing bonus of $25,000 in connection with her commencement of employment with us in March 2014. In addition, under her employment agreement, if Ms. DeYoung relocates her primary residence from the Dallas, Texas area to the Austin, Texas area during her employment with us, we will reimburse her for the reasonable and necessary documented moving

expenses (up to a maximum of $15,000), including up to two house-hunting trips and the moving of her household from the Dallas, Texas area to the Austin, Texas area.

Under Dr. Lammers' employment agreement, in the event Dr. Lammers' (i) employment with us is terminated for reason other than "cause" (as defined below), "disability" (as defined below) or death or (ii) resigns his employment for "good reason" (as defined below), and Dr. Lammers executes and does not revoke a general release of claims in favor of us, then Dr. Lammers will receive a severance payment equal to 12 months of Dr. Lammers' base salary, payable in 12 equal monthly installments. Under Mr. Irvin's and Ms. DeYoung's employment agreements, in the event their employment with us is terminated by us in connection with or after a "change in control" (as defined below) or, for Ms. DeYoung only, at any time without cause, and they execute and do not revoke a general release of claims in favor of us, then Ms. DeYoung and Mr. Irvin will receive a severance payment equal to six months of their applicable base salary, payable in six equal monthly installments. Dr. Kim does not have any severance or change in control benefits under his employment agreement.

For purposes of Dr. Lammers' employment agreement, "cause" means (i) the conviction of Dr. Lammers by a court of competent jurisdiction of a crime involving moral turpitude; (ii) the commission, or attempted commission, by Dr. Lammers of an act of fraud on us; (iii) the misappropriation, or attempted misappropriation, by Dr. Lammers of any of our funds or property; (iv) the failure by Dr. Lammers to perform in any material respect his obligations under the terms of his employment agreement, which such failure has gone unremedied within 10 days after we provide Dr. Lammers with written notice of such failure; (v) the knowing engagement by Dr. Lammers, without the written approval of our board of directors, in any direct, material conflict of interest with us without compliance with our conflict of interest policy; (vi) the knowing engagement by Dr. Lammers, without written approval of our board of directors, in any activity which competes with our business or which would result in a material injury to us or which otherwise violates any provision of his confidentiality, covenant not to solicit and arbitration agreement; or (vii) the knowing engagement by Dr. Lammers in any activity that would constitute a material violation of the provisions of our business ethics policy, employee handbook or similar policies, if any, then in effect.

For purposes of Dr. Lammers' employment agreement, "disability" means Dr. Lammers' inability to perform the essential functions of his position, with reasonable accommodation, due to Dr. Lammers' illness or physical or mental impairment or other incapacity which continues for a period in excess of 120 days (whether consecutive or not).

For purposes of Dr. Lammers' employment agreement, "good reason" means the occurrence, if within one year of a change in control, of a material diminution of Dr. Lammers' job responsibilities from those responsibilities set forth in his employment agreements, provided that in order for "good reason" to exist, each of the following conditions must be met: (i) the material diminution condition must have arisen without Dr. Lammers' consent; (ii) Dr. Lammers must provide written notice to us of such condition within 45 days of the initial existence of the condition; (iii) the condition specified in such notice must remain uncorrected for 30 days after receipt of such notice; and (iv) the date of Dr. Lammers' termination of employment must occur within 90 days after the initial existence of the condition specified in such notice.

For purposes of Dr. Lammers, Ms. DeYoung's and Mr. Irvin's employment agreements, "change in control" means (i) any person or entity, other than our stockholders as of April 18, 2013 for Dr. Lammers and Mr. Irvin and March 1, 2014 for Ms. DeYoung, our benefit plans, us or each of their respective affiliates and permitted transferees, acquires (by acquisition, merger, consolidation, recapitalization, reorganization or otherwise) beneficial ownership (as defined in Section 13(d) of the Securities Exchange Act of 1934, as amended) of more than 50% of our outstanding common stock; or (ii) we will have consummated a sale or other disposition of all or substantially all of our assets to any person or entity other to us, our benefit plans or any of their respective affiliates or successor entities;

provided, however, that the sale of equity securities by us for primarily capital raising purposes will not constitute a change in control.

Terms and Conditions of Equity Award Grants

Each of our NEOs received an option to purchase our common stock in fiscal year 2014. The table above entitled "Outstanding Equity Awards at 2014 Fiscal Year End" describes the material terms of other option awards made in past fiscal years to our NEOs.

In March 2014, our board of directors granted an option to purchase 1,083,700, 738,644, 218,500 and 211,000 shares of our common stock to Dr. Lammers, Ms. DeYoung, Dr. Kim and Mr. Irvin, respectively, with an exercise price of $0.54 per share, which the board determined was the fair market value on the date of grant. Each of the options vest and become exercisable as to 1/4th of the shares subject to the option on March 6, 2015, and as to 1/48th of the shares subject to the option on each monthly anniversary thereafter, such that 100% of the shares subject to the option will be vested and exercisable on March 6, 2018, subject to these NEOs continuing to provide services to us through such vesting date.

Terms and Conditions of 401(k) Plan

Our U.S. eligible employees, including our NEOs, participate in our 401(k) Plan. Enrollment in the 401(k) Plan is automatic for employees who meet eligibility requirements unless they decline participation. The 401(k) plan is intended to qualify under Section 401(k) of the Internal Revenue Service Code of 1986, as amended, so that contributions to the 401(k) plan by employees or by us, and the investment earnings thereon, are not taxable to the employees until withdrawn from the 401(k) plan, and so that contributions by us, if any, will be deductible by us when made. Under the 401(k) plan, employees may elect to reduce their current compensation by up to the statutorily prescribed annual limit and to have the amount of such reduction contributed to the 401(k) plan. Under the 401(k), for fiscal year 2014, we provide matching contributions of $0.50 per dollar up to 8% of an employee's compensation.

Equity Compensation Plans

2015 Equity Incentive Award Plan

We have adopted the 2015 Equity Incentive Award Plan, or 2015 Plan, which will be effective on the closing of this offering. The principal purpose of the 2015 Plan is to attract, retain and motivate selected employees, consultants and directors through the granting of stock-based compensation awards and cash-based performance bonus awards. The material terms of the 2015 Plan are summarized below.

Share Reserve. Under the 2015 Plan, shares of our common stock will be initially reserved for issuance pursuant to a variety of stock-based compensation awards, including stock options, stock appreciation rights, or SARs, restricted stock awards, restricted stock unit awards, deferred stock awards, dividend equivalent awards, stock payment awards, performance awards and other stock-based awards, plus the number of shares remaining available for future awards under the 2008 Long Term Incentive Plan, as amended, or 2008 Stock Plan, as of the consummation of this offering. The number of shares initially reserved for issuance or transfer pursuant to awards under the 2015 Plan will be increased by (i) the number of shares represented by awards outstanding under our 2008 Stock Plan that are forfeited or lapse unexercised and which following the effective date are not issued under our 2008 Stock Plan and (ii), if approved by our board of directors or the compensation committee of our board of directors, an annual increase on the first day of each fiscal year beginning in 2015 and ending in 2024, equal to the least of (A) shares, (B) percent (%) of the shares of stock outstanding (on an as converted basis) on the last day of the immediately preceding fiscal year and (C) such smaller number of shares of stock as determined by our board of directors; provided,

however, that no more than shares of stock may be issued upon the exercise of incentive stock options.

The following counting provisions will be in effect for the share reserve under the 2015 Plan:

- to the extent that an award terminates, expires or lapses for any reason or an award is settled in cash without the delivery of shares, any shares subject to the award at such time will be available for future grants under the 2015 Plan;
- to the extent shares are tendered or withheld to satisfy the grant, exercise price or tax withholding obligation with respect to any award under the 2015 Plan, such tendered or withheld shares will be available for future grants under the 2015 Plan;
- to the extent that shares of our common stock are repurchased by us prior to vesting so that shares are returned to us, such shares will be available for future grants under the 2015 Plan;
- the payment of dividend equivalents in cash in conjunction with any outstanding awards will not be counted against the shares available for issuance under the 2015 Plan; and
- to the extent permitted by applicable law or any exchange rule, shares issued in assumption of, or in substitution for, any outstanding awards of any entity acquired in any form of combination by us or any of our subsidiaries will not be counted against the shares available for issuance under the 2015 Plan.

Administration. The compensation committee of our board of directors is expected to administer the 2015 Plan unless our board of directors assumes authority for administration. The compensation committee must consist of at least three members of our board of directors, each of whom is intended to qualify as an "outside director," within the meaning of Section 162(m) of the Code, a "non-employee director" for purposes of Rule 16b-3 under the Exchange Act and an "independent director" within the meaning of the rules of the applicable stock exchange, or other principal securities market on which shares of our common stock are traded. The 2015 Plan provides that the board or compensation committee may delegate its authority to grant awards to employees other than executive officers and certain senior executives of the company to a committee consisting of one or more members of our board of directors or one or more of our officers, other than awards made to our non-employee directors, which must be approved by our full board of directors.

Subject to the terms and conditions of the 2015 Plan, the administrator has the authority to select the persons to whom awards are to be made, to determine the number of shares to be subject to awards and the terms and conditions of awards, and to make all other determinations and to take all other actions necessary or advisable for the administration of the 2015 Plan. The administrator is also authorized to adopt, amend or rescind rules relating to administration of the 2015 Plan. Our board of directors may at any time remove the compensation committee as the administrator and revest in itself the authority to administer the 2015 Plan. The full board of directors will administer the 2015 Plan with respect to awards to non-employee directors.

Eligibility. Options, SARs, restricted stock and all other stock-based and cash-based awards under the 2015 Plan may be granted to individuals who are then our officers, employees or consultants or are the officers, employees or consultants of certain of our subsidiaries. Such awards also may be granted to our directors. Only employees of our company or certain of our subsidiaries may be granted incentive stock options, or ISOs.

Awards. The 2015 Plan provides that the administrator may grant or issue stock options, SARs, restricted stock, restricted stock units, deferred stock, dividend equivalents, performance awards, stock payments and other stock-based and cash-based awards, or any combination thereof. Each award will be set forth in a separate agreement with the person receiving the award and will indicate the type, terms and conditions of the award.

- *Nonstatutory Stock Options*, or NSOs, will provide for the right to purchase shares of our common stock at a specified price which may not be less than fair market value on the date of grant, and usually will become exercisable (at the discretion of the administrator) in one or more installments after the grant date, subject to the participant's continued employment or service with us and/or subject to the satisfaction of corporate performance targets and individual performance targets established by the administrator. NSOs may be granted for any term specified by the administrator that does not exceed 10 years.

- *Incentive Stock Options*, or ISOs, will be designed in a manner intended to comply with the provisions of Section 422 of the Code and will be subject to specified restrictions contained in the Code. Among such restrictions, ISOs must have an exercise price of not less than the fair market value of a share of common stock on the date of grant, may only be granted to employees, and must not be exercisable after a period of 10 years measured from the date of grant. In the case of an ISO granted to an individual who owns (or is deemed to own) at least 10% of the total combined voting power of all classes of our capital stock, the 2015 Plan provides that the exercise price must be at least 110% of the fair market value of a share of common stock on the date of grant and the ISO must not be exercisable after a period of five years measured from the date of grant.

- *Restricted Stock* may be granted to any eligible individual and made subject to such restrictions as may be determined by the administrator. Restricted stock, typically, may be forfeited for no consideration or repurchased by us at the original purchase price if the conditions or restrictions on vesting are not met. In general, restricted stock may not be sold or otherwise transferred until restrictions are removed or expire. Purchasers of restricted stock, unlike recipients of options, will have voting rights and will have the right to receive dividends, if any, prior to the time when the restrictions lapse, however, extraordinary dividends will generally be placed in escrow, and will not be released until restrictions are removed or expire.

- *Restricted Stock Units* may be awarded to any eligible individual, typically without payment of consideration, but subject to vesting conditions based on continued employment or service or on performance criteria established by the administrator. Like restricted stock, restricted stock units may not be sold, or otherwise transferred or hypothecated, until vesting conditions are removed or expire. Unlike restricted stock, stock underlying restricted stock units will not be issued until the restricted stock units have vested, and recipients of restricted stock units generally will have no voting or dividend rights prior to the time when vesting conditions are satisfied.

- *Deferred Stock Awards* represent the right to receive shares of our common stock on a future date. Deferred stock may not be sold or otherwise hypothecated or transferred until issued. Deferred stock will not be issued until the deferred stock award has vested, and recipients of deferred stock generally will have no voting or dividend rights prior to the time when the vesting conditions are satisfied and the shares are issued. Deferred stock awards generally will be forfeited, and the underlying shares of deferred stock will not be issued, if the applicable vesting conditions and other restrictions are not met.

- *Stock Appreciation Rights*, or SARs, may be granted in connection with stock options or other awards, or separately. SARs granted in connection with stock options or other awards typically will provide for payments to the holder based upon increases in the price of our common stock over a set exercise price. The exercise price of any SAR granted under the 2015 Plan must be at

least 100% of the fair market value of a share of our common stock on the date of grant. Except as required by Section 162(m) of the Code with respect to a SAR intended to qualify as performance-based compensation as described in Section 162(m) of the Code, there are no restrictions specified in the 2015 Plan on the exercise of SARs or the amount of gain realizable therefrom, although restrictions may be imposed by the administrator in the SAR agreements. SARs under the 2015 Plan will be settled in cash or shares of our common stock, or in a combination of both, at the election of the administrator.

- *Dividend Equivalents* represent the value of the dividends, if any, per share paid by us, calculated with reference to the number of shares covered by the award. Dividend equivalents may be settled in cash or shares and at such times as determined by the compensation committee or board of directors, as applicable.

- *Performance Awards* may be granted by the administrator on an individual or group basis. Generally, these awards will be based upon specific performance targets and may be paid in cash or in common stock or in a combination of both. Performance awards may include "phantom" stock awards that provide for payments based upon the value of our common stock. Performance awards may also include bonuses that may be granted by the administrator on an individual or group basis and which may be payable in cash or in common stock or in a combination of both.

- *Stock Payments* may be authorized by the administrator in the form of common stock or an option or other right to purchase common stock as part of a deferred compensation or other arrangement in lieu of all or any part of compensation, including bonuses, that would otherwise be payable in cash to the employee, consultant or non-employee director.

Change in Control. In the event of a change in control where the acquiror does not assume or replace awards granted, prior to the consummation of such transaction, awards issued under the 2015 Plan will be subject to accelerated vesting such that 100% of such awards will become vested and exercisable or payable, as applicable. In addition, the administrator will also have complete discretion to structure one or more awards under the 2015 Plan to provide that such awards will become vested and exercisable or payable on an accelerated basis in the event such awards are assumed or replaced with equivalent awards but the individual's service with us or the acquiring entity is subsequently terminated within a designated period following the change in control event. The administrator may also make appropriate adjustments to awards under the 2015 Plan and is authorized to provide for the acceleration, cash-out, termination, assumption, substitution or conversion of such awards in the event of a change in control or certain other unusual or nonrecurring events or transactions. Under the 2015 Plan, a change in control is generally defined as:

- the transfer or exchange in a single transaction or series of related transactions by our stockholders of more than 50% of our voting stock to a person or group;

- a change in the composition of our board of directors over a two- year period such that 50% or more of the members of the board of directors were elected through one or more contested elections;

- a merger, consolidation, reorganization or business combination in which we are involved, directly or indirectly, other than a merger, consolidation, reorganization or business combination which results in our outstanding voting securities immediately before the transaction continuing to represent a majority of the voting power of the acquiring company's outstanding voting securities and after which no person or group beneficially owns 50% or more of the outstanding voting securities of the surviving entity immediately after the transaction;

- the sale, exchange, or transfer of all or substantially all of our assets; or

- stockholder approval of our liquidation or dissolution.

Adjustments of Awards. In the event of any stock dividend, stock split, combination or exchange of shares, merger, consolidation, spin-off, recapitalization, distribution of our assets to stockholders (other than normal cash dividends) or any other corporate event affecting the number of outstanding shares of our common stock or the share price of our common stock that would require adjustments to the 2015 Plan or any awards under the 2015 Plan in order to prevent the dilution or enlargement of the potential benefits intended to be made available thereunder, the administrator will make appropriate, proportionate adjustments to:

- the aggregate number and type of shares subject to the 2015 Plan;
- the number and kind of shares subject to outstanding awards and terms and conditions of outstanding awards (including, without limitation, any applicable performance targets or criteria with respect to such awards); and
- the grant or exercise price per share of any outstanding awards under the 2015 Plan.

Amendment and Termination. Our board of directors or the compensation committee (with board approval) may terminate, amend or modify the 2015 Plan at any time and from time to time. However, we must generally obtain stockholder approval:

- to increase the number of shares available under the 2015 Plan (other than in connection with certain corporate events, as described above);
- to grant options with an exercise price that is below 100% of the fair market value of shares of our common stock on the grant date;
- to extend the exercise period for an option beyond 10 years from the date of grant; or
- to the extent required by applicable law, rule or regulation (including any applicable stock exchange rule).

Notwithstanding the foregoing, an option may be amended to reduce the per share exercise price below the per share exercise price of such option on the grant date and options may be granted in exchange for, or in connection with, the cancellation or surrender of options having a higher per share exercise price without receiving additional stockholder approval.

Termination. The board of directors may terminate the 2015 Plan at any time. No incentive stock options may be granted pursuant to the 2015 Plan after the tenth anniversary of the effective date of the 2015 Plan, and no additional annual share increases to the 2015 Plan's aggregate share limit will occur from and after such anniversary. Any award that is outstanding on the termination date of the 2015 Plan will remain in force according to the terms of the 2015 Plan and the applicable award agreement.

We intend to file with the SEC a registration statement on Form S-8 covering the shares of our common stock issuable under the 2015 Plan.

2008 Long Term Incentive Plan

Our board of directors adopted, and our stockholders approved, the 2008 Stock Plan effective as of May 15, 2008, which was subsequently amended on November 3, 2009, October 22, 2012 and March 10, 2014 to increase the number of shares issuable under the 2008 Stock Plan. The 2008 Stock Plan provided for the grant of ISOs, NSOs, SARs, restricted stock, restricted stock units, bonus stock awards, dividend equivalents, performance awards and other stock-based awards. As of June 30, 2015, options to purchase 12,280,909 shares of our common stock at a weighted-average exercise price per share of $0.37 remained outstanding under the 2008 Stock Plan. No other equity awards have been

granted under the 2008 Stock Plan. As of June 30, 2015, 2,264,241 shares of our common stock were available for future issuance pursuant to awards granted under the 2008 Stock Plan. Following this offering and in connection with the effectiveness of our 2015 Plan, the 2008 Stock Plan will terminate and no further awards will be granted under the 2008 Stock Plan. However, all outstanding awards will continue to be governed by their existing terms.

Administration. Our board of directors, or a committee thereof appointed by our board of directors, has the authority to administer the 2008 Stock Plan and the awards granted under it. In addition, the administrator may delegate to our officers or managers or committees thereof the authority to grant awards to persons who are not subject to Section 16 of the Exchange Act and to such extent that awards that are intended to qualify as "performance-based compensation" under Section 162(m) of the Code would not fail to so qualify. The administrator has the authority to select the employees to whom awards will be granted under the 2008 Stock Plan, the number of shares to be subject to those awards under the 2008 Stock Plan, and the terms and conditions of the awards granted. In addition, the administrator has the authority to construe and interpret the 2008 Stock Plan and to adopt rules for the administration, interpretation and application of the 2008 Stock Plan that are consistent with the terms of the 2008 Stock Plan.

Awards. The 2008 Stock Plan provides that the administrator may grant or issue options, including ISOs and NSOs, SARs, restricted stock, restricted stock units, bonus stock awards, dividend equivalents, performance awards and other stock-based awards to employees, consultants and directors; provided that only employees may be granted incentive stock options. Each award will be set forth in a separate agreement with the person receiving the award and will indicate the type, terms and conditions of the award, including any performance conditions that may be specified by the administrator. In addition, under the 2008 Stock Plan each award and any stock issued under such awards will be subject to a right of first refusal in favor of us, which will terminate upon the consummation of this offering.

- *Stock Options.* The 2008 Stock Plan provides for the grant of ISOs under the federal tax laws or NSOs. ISOs may be granted only to employees. NSOs may be granted to employees, directors or consultants. The exercise price of ISOs granted to employees who at the time of grant own stock representing more than 10% of the voting power of all classes of our common stock may not be less than the greater of (i) the par value of our common stock or (ii) 110% of the fair market value per share of our common stock on the date of grant, and the exercise price of ISOs granted to any other employees may not be less than the greater of (i) the par value of our common stock or (ii) 100% of the fair market value per share of our common stock on the date of grant. The exercise price of NSOs to employees, directors or consultants may not be less than the greater of (i) the par value of our common stock or (ii) 100% of the fair market value per share of our common stock on the date of grant. Shares subject to options under the 2008 Stock Plan generally vest in a series of installments over an optionee's period of service.

- *Stock Appreciation Rights.* The 2008 Stock Plan provides that we may issue SARs. Each SAR will be governed by a stock appreciation right agreement and may be granted in connection with stock options or other awards, or separately. SARs granted in connection with stock options or other awards typically will provide for payments to the holder based upon increases in the price of our common stock over a set exercise price.

- *Restricted Stock Awards.* The 2008 Stock Plan provides that we may issue restricted stock awards. Each restricted stock award will be governed by a restricted stock award agreement, which will details the restrictions on transferability, risk of forfeiture and other restrictions the administrator approves. In general, restricted stock may not be sold, transferred, pledged, hypothecated, margined or otherwise encumbered until restrictions are removed or expire.

Holders of restricted stock, unlike recipients of other equity awards, will have voting rights and will have the right to receive dividends, if any, prior to the time when the restrictions lapse.

- *Restricted Stock Units.* The 2008 Stock Plan provides that we may issue restricted stock unit awards which may be settled in either cash of common stock. Each restricted stock unit award will be governed by a restricted stock unit award agreement and may be awarded to any eligible individual, typically without payment of consideration, but subject to vesting conditions based on continued employment or service or on performance criteria established by the administrator. Like restricted stock, restricted stock units may not be sold, or otherwise transferred or hypothecated, until vesting conditions are removed or expire. Unlike restricted stock, stock underlying restricted stock units will not be issued until the restricted stock units have vested, and recipients of restricted stock units generally will have no voting or, unless otherwise determined by the administrator, dividend rights prior to the time when vesting conditions are satisfied, except dividend equivalents may be credited in respect of shares of common stock.

- *Bonus Stock Awards.* The 2008 Stock Plan provides that we may award bonuses in the form of common stock or award stock or other awards in lieu of all or any part of obligations to pay cash or deliver other property under the 2008 Stock Plan or under other plans or compensatory arrangements to the employee, consultant or non-employee director. In the case of any grant of stock to an officer in lieu of salary or other cash compensation, the number of shares granted in lieu of such compensation will be reasonable, as determined by the administrator.

- *Dividend Equivalents.* The 2008 Stock Plan provides that dividend equivalents may be awarded to employees, consultants or directors. Dividend equivalents represent the value of the dividends, if any, per share paid by us, calculated with reference to the number of shares covered by the award. Dividend equivalents may be settled in cash, shares, other awards or other property equal in value to dividends paid and at such times as determined by the administrator.

- *Performance Awards.* The 2008 Stock Plan provides that performance awards may be granted by the administrator on an individual or group basis. Generally, these awards will be based upon specific performance targets and may be paid in cash or in common stock or in a combination of both. Performance awards may also include bonuses that may be granted by the administrator on an individual or group basis and which may be payable in cash or in common stock or in a combination of both.

- *Other Stock Awards.* The 2008 Stock Plan provides that we may issue other stock or cash awards. Each stock award will be governed by a stock award agreement and may be authorized by the administrator in the form of common stock in whole or in part and may be granted either alone or in addition to other stock awards described above.

Detrimental Activity. If at any time prior to the third anniversary of the most recent termination of an employee's service with us, the administrator determines that such employee, at any time during his or her most recent service with us, or within the three-year period after termination of such service, engaged in any detrimental activity, then such employee shall (i) immediately forfeit the right to exercise any and all options granted to him or her under the 2008 Stock Plan, irrespective of whether the vested or unvested; and (ii) upon demand by the administrator, promptly return to us any or all shares of our common stock acquired pursuant to awards granted to employee under the 2008 Stock Plan and all associated dividends. The purchase price per share of common stock returned to us will be an amount equal to employee's purchase price per share as reflected in each such award.

Subdivision or Consolidation of Shares. In the event of certain corporate adjustments, the administrator of the 2008 Stock Plan will adjust the class and maximum number of shares of common stock that may be delivered under the 2008 Stock Plan, the class and maximum number of shares of

common stock that may be issued pursuant to the exercise of ISOs and/or the number, class and price of shares of common stock covered by each outstanding award.

Corporate Recapitalization. In the event we recapitalize, reclassify our capital stock or other change our capital structure, the number and class of shares covered by an option or an SAR will be proportionately adjusted. In the event of changes in the outstanding shares by reason of recapitalization, reorganizations, mergers, consolidations, combinations, exchanges or other relevant changes in capitalization occurring after the date of the grant of any award and not otherwise provided in the 2008 Stock Plan, any outstanding awards and any agreements evidencing such awards shall be subject to adjustment by the administrator at its discretion as to the number and price of shares or other consideration subject to such Awards.

Change in Control. Upon a change in control, the administrator, acting without the consent or approval of any holder, will take one or more of the following alternatives, which may vary among individual holders and which may vary among options or SARs held by any individual: (i) accelerate the time at which awards then outstanding may be exercised so that such awards may be exercised in full for a limited period of time on or before a specified date fixed by the administrator, after which specified date all unexercised awards will terminate; (ii) require the mandatory surrender to us by selected holders of some or all of the outstanding awards held by such holders specified by the administrator, in which event the administrator will cancel such awards and pay to each holder an amount of cash per share equal to the excess, if any, of the spread value for such shares; or (iii) make such adjustments to awards then outstanding as the administrator deems appropriate.

Amendment; Termination. Our board of directors may amend or terminate the 2008 Stock Plan or any portion thereof at any time, but no amendment will impair the rights of a holder of an outstanding award without the holder's consent. An amendment of the 2008 Stock Plan shall be subject to the approval of our stockholders, where such approval by our stockholders of an amendment is required by applicable law. Following this offering and in connection with the effectiveness of our 2015 Plan, the 2008 Stock Plan will terminate and no further awards will be granted under the 2008 Stock Plan.

We intend to file with the SEC a registration statement on Form S-8 covering our shares of common stock issuable under the 2008 Stock Plan.

Rule 10b5-1 Sales Plans

Our directors and executive officers may adopt written plans, known as Rule 10b5-1 plans, in which they will contract with a broker to buy or sell shares of our common stock on a periodic basis. Under a Rule 10b5-1 plan, a broker executes trades pursuant to parameters established by the director or officer when entering into the plan, without further direction from the director or officer. The director or officer may amend or terminate the plan in limited circumstances. Our directors and executive officers may also buy or sell additional shares of our common stock outside of a Rule 10b5-1 plan when they are not in possession of material, nonpublic information.

Certain Relationships and Related Party Transactions

The following is a description of transactions since January 1, 2012 to which we have been a party, in which the amount involved exceeds $120,000, and in which any of our directors, executive officers or holders of more than 5% of our capital stock, or an affiliate or immediate family member thereof, had or will have a direct or indirect material interest.

Sales and Purchases of Securities

Winkler Convertible Promissory Note

In June 2011, we issued a convertible promissory note to Matthew Winkler, Ph.D., that allowed us to draw amounts from time to time up to the aggregate maximum principal sum of $1.0 million. In January 2012 and June 2012, we amended and restated the convertible promissory note with Dr. Winkler, raising the aggregate maximum principal sum to $1.5 million and extending the maturity date. During the period the promissory note, as amended, was outstanding, we borrowed an aggregate principal amount of $750,000. In October 2012, Dr. Winkler contributed the entire principal amount of, and accrued interest on, the promissory note, as amended, to us in exchange for shares of Series C convertible preferred stock, which was distributed in a dividend to the holders of Series A convertible preferred stock and Series B convertible preferred stock. Dr. Winkler, who is a member of our board of directors and holder of our capital stock, currently serves as the Chairman and Chief Scientific Officer, and is a founder and holder of capital stock, of Asuragen, Inc., or Asuragen.

Asuragen Convertible Promissory Note

In June 2012, we issued a convertible promissory note to Asuragen that allowed us to draw amounts from time to time up to the aggregate maximum principal sum of $500,000. In October 2012, we repaid the full amount of all principal drawn on the promissory note, and accrued and unpaid interest thereon, of $122,866 in cash. Dr. Winkler, who is a member of our board of directors and holder of our capital stock, currently serves as the Chairman and Chief Scientific Officer, and is a founder and holder of capital stock, of Asuragen.

Series C Convertible Preferred Stock Financing

In October 2012 and December 2013, we issued an aggregate of 67,779,942 shares of our Series C convertible preferred stock at a price per share of $0.509 for aggregate gross consideration of approximately $34.5 million to 18 accredited investors. The table below sets forth the number of shares of Series C convertible preferred stock sold to our directors, executive officers or holders of more than 5% of our capital stock, or an affiliate or immediate family member thereof:

Name	Number of Shares of Series C Preferred Stock	Aggregate Purchase Price
Sofinnova Venture Partners VIII, L.P.(1)	18,664,046	$ 9,499,999.42
New Enterprise Associates 14 L.P.(2)	18,624,754	9,479,999.79
NEA Ventures 2012, Limited Partnership(2)	39,292	19,999.63
Pfizer Inc.(3)	15,717,092	7,999,999.82
Osage University Partners I, L.P.	4,911,590	2,499,999.32
Matthew Winkler, Ph.D.(4)	4,273,082	2,174,998.78

(1) Michael Powell, Ph.D., who is a member of our board of directors, is a General Partner of Sofinnova Venture Partners VIII, L.P.

(2) Edward Mathers, who is a member of our board of directors, is a Partner of New Enterprise Associates 14 L.P. and NEA Ventures 2012, Limited Partnership. NEA Ventures 2012, Limited Partnership, is an affiliated fund of New Enterprise Associates 14 L.P.

(3) Elaine V. Jones, Ph.D., who is a member of our board of directors, is the Executive Director, Venture Capital-Worldwide Business Development of Pfizer Inc.

(4) Includes an aggregate of 1,768,170 shares of Series C convertible preferred stock purchased by certain trusts for the benefit of members of Dr. Winkler's family. Dr. Winkler disclaims beneficial ownership of all such shares, as he does not have voting or investment power with respect to such shares.

Series D Convertible Preferred Stock Financing

In March and April 2015, we issued an aggregate of 68,395,299 shares of our Series D convertible preferred stock at a price per share of $0.611 for aggregate gross consideration of approximately $41.8 million to 24 accredited investors. The table below sets forth the number of shares of Series D convertible preferred stock sold to our directors, executive officers or holders of more than 5% of our capital stock, or an affiliate or immediate family member thereof:

Name	Number of Shares of Series D Preferred Stock	Aggregate Purchase Price
Eastern Capital Limited	9,819,968	$ 6,000,000.45
Sofinnova Venture Partners VIII, L.P.(1)	8,753,393	5,348,323.12
New Enterprise Associates 14 L.P.(2)	8,753,393	5,348,323.12
Baxter Healthcare Corporation	8,183,307	5,000,000.58
Pfizer Inc.(3)	7,371,278	4,503,850.86
Matthew Winkler, Ph.D.(4)	2,809,165	1,716,399.82
Osage University Partners I, L.P.	2,526,390	1,543,624.29
Lawrence M. Alleva Profit Sharing Plan(5)	57,284	35,000.52

(1) Michael Powell, Ph.D., who is a member of our board of directors, is a General Partner of Sofinnova Venture Partners VIII, L.P.

(2) Edward Mathers, who is a member of our board of directors, is a Partner of New Enterprise Associates 14 L.P. and NEA Ventures 2012, Limited Partnership. NEA Ventures 2012, Limited Partnership, is an affiliated fund of New Enterprise Associates 14 L.P.

(3) Elaine V. Jones, Ph.D., who is a member of our board of directors, is the Executive Director, Venture Capital-Worldwide Business Development of Pfizer Inc.

(4) Includes an aggregate of 1,768,170 shares of Series D convertible preferred stock purchased by certain trusts for the benefit of members of Dr. Winkler's family. Dr. Winkler disclaims beneficial ownership of all such shares, as he does not have voting or investment power with respect to such shares.

(5) Lawrence M. Alleva, who is a member of our board of directors, is a participant and beneficiary of the Lawrence M. Alleva Profit Sharing Plan.

Texas Emerging Technology Fund

In November 2009, we received a $5.0 million investment from the Texas Emerging Technology Fund, or the TETF. In exchange for the investment, the TETF received a promissory note for a principal amount of $5.0 million as well as a warrant to acquire our capital stock, with the number of shares and type of capital determined based on our subsequent financing activity. In August 2011, we completed a Series B convertible preferred stock financing for aggregate gross consideration of approximately $1.5 million, which allowed the TETF to exercise its rights under the warrant to acquire, by cashless exercise, 2,243,330 shares, which gives effect to the 10-for-1 reverse stock split in October 2012, of our Series B convertible preferred stock. In October 2012, in conjunction with the initial sale of our Series C convertible preferred stock, we and the TETF amended the investment documentation to provide for the exchange of all outstanding shares of our Series B convertible preferred stock held by the TETF for 10,914,647 shares of a newly-established Series B-1 convertible preferred stock. As a part of the amendments, the promissory note with the TETF was deemed satisfied in full and canceled.

Relationship with Asuragen

In November 2009, in connection with our spin-off from Asuragen, we entered into an asset contribution agreement, cross-license agreement, supply agreement and services agreement with Asuragen. In October 2010, October 2011 and January 2013, we entered into new services agreements with Asuragen. In October 2014, we entered into a sublease agreement with Asuragen. See "Business—Facilities and Services Agreement with Asuragen" Pursuant to these agreements, we paid Asuragen rent and a fee for certain services, including general accounting, payroll, shipping and receiving, information technology services and the use of facilities, in the aggregate amount of $813,145, $527,363 and $520,356 in the fiscal years ended December 31, 2012, 2013 and 2014, respectively, and $239,250 in the six months ended June 30, 2015. These amounts do not include services that we used as a customer of Asuragen during this time frame. Dr. Winkler, who is a member of our board of directors and holder of our capital stock, currently serves as the Chairman and Chief Scientific Officer, and is a founder and holder of capital stock, of Asuragen.

Indemnification Agreements and Directors' and Officers' Liability Insurance

We have entered into indemnification agreements with each of our directors and executive officers. These agreements, among other things, require us to indemnify each director and executive officer to the fullest extent permitted by Delaware law, including indemnification of expenses such as attorneys' fees, judgments, fines and settlement amounts incurred by the director or executive officer in any action or proceeding, including any action or proceeding by or in right of us, arising out of the person's services as a director or executive officer.

Investor Rights Agreement

We have entered into an amended and restated investor rights agreement with the purchasers of our outstanding preferred stock and certain holders of common stock, including entities with which certain of our directors are affiliated. As of June 30, 2015, the holders of approximately 152,416,065 shares of our common stock, including the shares of common stock issuable upon the conversion of our preferred stock, are entitled to rights with respect to the registration of their shares under the Securities Act. For a more detailed description of these registration rights, see "Description of Capital Stock—Registration Rights." The investor rights agreement also provides for a right of first refusal in favor of certain holders of preferred stock with regard to certain issuances of our capital stock. The rights of first refusal will not apply to, and will terminate upon consummation of, this offering.

Voting Agreement

We have entered into an amended and restated voting agreement with certain holders of our common stock and holders of our convertible preferred stock. Upon the closing of this offering, the amended and restated voting agreement will terminate. For a description of the amended and restated voting agreement, see the section titled "Management—Board Composition—Voting Arrangements."

Right of First Refusal and Co-Sale Agreement

We have entered into an amended and restated right of first refusal and co-sale agreement with certain holders of our common stock and holders of our preferred stock. This agreement provides for rights of first refusal and co-sale relating to the shares of our common stock and common stock issuable upon conversion of the shares of preferred stock held by the parties thereto. Upon the closing of this offering, the amended and restated right of first refusal and co-sale agreement will terminate.

Other Business Relationships

Denise Powell is the sister of Michael Powell, a member of our board of directors, and is a former employee and current consultant of ODA-WG, Inc., d/b/a BrewLife, or BrewLife, our former investor relations firm. Our engagement with BrewLife was negotiated at arm's length. As of June 30, 2015, we have paid BrewLife a total of approximately $130,000 during this engagement. Although Ms. Powell has provided services to us in her capacity with BrewLife from time to time, Ms. Powell's compensation is not dependent on or affected by the services provided to us by BrewLife or by any payments we make to BrewLife in exchange for such services.

Policies and Procedures for Related Party Transactions

Our board of directors has adopted a written related person transaction policy, to be effective upon the consummation of this offering, setting forth the policies and procedures for the review and approval or ratification of related person transactions. This policy will cover, with certain exceptions set forth in Item 404 of Regulation S-K under the Securities Act, any transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships in which we were or are to be a participant, where the amount involved exceeds $120,000 and a related person had or will have a direct or indirect material interest, including, without limitation, purchases of goods or services by or from the related person or entities in which the related person has a material interest, indebtedness, guarantees of indebtedness and employment by us of a related person. In reviewing and approving any such transactions, our audit committee is tasked to consider all relevant facts and circumstances, including, but not limited to, whether the transaction is on terms comparable to those that could be obtained in an arm's length transaction and the extent of the related person's interest in the transaction. All of the transactions described in this section occurred prior to the adoption of this policy.

Principal Stockholders

The following table sets forth information relating to the beneficial ownership of our common stock as of June 30, 2015, by:

- each person, or group of affiliated persons, known by us to beneficially own more than 5% of our outstanding shares of common stock;
- each of our current directors;
- each of our named executive officers; and
- all directors and executive officers as a group.

The number of shares beneficially owned by each entity, person, director or executive officer is determined in accordance with the rules of the SEC, and the information is not necessarily indicative of beneficial ownership for any other purpose. Under such rules, beneficial ownership includes any shares over which the individual has sole or shared voting power or investment power as well as any shares that the individual has the right to acquire within 60 days of June 30, 2015 through the exercise of any stock option, warrants or other rights. Except as otherwise indicated, and subject to applicable community property laws, the persons named in the table have sole voting and investment power with respect to all shares of common stock held by that person.

The percentage of shares beneficially owned is computed on the basis of 153,801,687 shares of our common stock outstanding as of July 31, 2015, which reflects the assumed conversion of all of our outstanding shares of preferred stock into an aggregate of 152,396,065 shares of common stock. Percentage ownership of our common stock after the offering assumes the sale of shares by us in this offering. Shares of our common stock that a person has the right to acquire within 60 days of June 30, 2015 are deemed outstanding for purposes of computing the percentage ownership of the person holding such rights, but are not deemed outstanding for purposes of computing the percentage ownership of any other person, except with respect to the percentage ownership of all directors and

executive officers as a group. Unless otherwise indicated below, the address for each beneficial owner listed is c/o Mirna Therapeutics, Inc., at 2150 Woodward Street, Suite 100, Austin, Texas 78744.

	Beneficial Ownership Prior to this Offering				Beneficial Ownership After this Offering	
Name and Address of Beneficial Owner	Number of Shares Beneficially Owned	Number of Shares Exercisable Within 60 Days	Number of Shares Beneficially Owned	Percentage of Beneficial Ownership	Number of Shares Beneficially Owned	Percentage of Beneficial Ownership
5% and Greater Stockholders						
Sofinnova Venture Partners VIII, L.P.(1)	27,417,439	—	27,417,439	17.83%		
Entities Associated with New Enterprise Associates(2)	27,417,439	—	27,417,439	17.83%		
Pfizer Inc.(3)	23,088,370	—	23,088,370	15.01%		
State of Texas(4)	10,914,647	—	10,914,647	7.10%		
Eastern Capital Limited(5)	9,819,968	—	9,819,968	6.39%		
Baxalta US Inc.(6)	8,183,307	—	8,183,307	5.32%		
Named Executive Officers and Directors(7)						
Paul Lammers, M.D., M.Sc.(8)	11,196,465	2,303,886	13,500,351	8.78%		
Jon Irvin	—	336,840	336,840	*		
Casi DeYoung	—	288,966	288,966	*		
Sinil Kim, M.D.	178,124	168,912	347,036	*		
Michael Powell, Ph.D.(1)	27,417,439	20,000	27,437,439	17.84%		
Elaine Jones, Ph.D.	—	12,000	12,000	*		
Ed Mathers	—	12,000	12,000	*		
Matthew Winkler, Ph.D.(9)	10,717,131	12,000	10,729,131	6.98%		
Lawrence M. Alleva(10)	57,284	116,000	173,284	*		
Clay B. Siegall Ph.D.	—	289,657	289,657	*		
All directors and executive officers as a group (10 persons)(11)	49,566,443	3,560,261	53,126,704	34.55%		

* Indicates beneficial ownership of less than 1% of the total outstanding common stock.

(1) Consists of 27,417,439 shares held by Sofinnova Ventures Partners VIII, L.P., or SVP VIII, prior to this offering. Sofinnova Management VIII, L.L.C., or SM VIII, is the general partner of SVP VIII. The individual Managers, or the Managing Members, of SVP VIII are Michael Powell, James Healy, Srinivas Akkaraju and Anand Mehra. The Managers share voting and dispositive power with regard to the shares held directly by SVP VIII. The address of SVP VIII is 3000 Sand Hill Road, Bldg. 4, Suite 250, Menlo Park, CA 94025.

(2) Consists of: (i) 27,378,147 shares held prior to this offering by New Enterprise Associates 14, L.P., or NEA 14, and (ii) 39,292 shares held prior to this offering by NEA Ventures 2012 Limited Partnership, or Ven 2012. The shares directly held by NEA 14 are indirectly held by NEA Partners 14, L.P., or NEA Partners 14, the sole general partner of NEA 14. NEA 14 GP, LTD, or NEA 14 LTD, is the sole general partner of NEA Partners 14. The individual Managers, or the Managers, of NEA 14 LTD are M. James Barrett, Peter J. Barris, Forest Baskett, Ryan D. Drant, Anthony A. Florence, Jr., Patrick J. Kerins, Krishna Kolluri, David M. Mott, Scott D. Sandell, Peter Sonsini, Ravi Viswanathan and Harry R. Weller. The Managers share voting and dispositive power with regard to shares held directly by NEA 14. The shares directly held by Ven 2012 are indirectly held by Karen P. Welsh, the sole general partner of Ven 2012. Karin P. Welsh holds voting and dispositive power over the shares held by Ven 2012. The address of NEA 14 and Ven 2012 is 1954 Greenspring Drive, Suite 600, Timonium, MD 21903.

(3) The address for this entity is 235 E. 42nd Street, New York, NY 10017.

(4) The State of Texas has granted Dr. Lammers, through his position as our Chief Executive Officer, a revocable proxy of all of its voting rights. The address of this entity is State of Texas c/o Texas Emerging Technology Fund, PO Box 12428, Austin, Texas 78711.

(5) Eastern Capital Limited is a Cayman Islands corporation. Portfolio Services Ltd., a Cayman Islands corporation, owns all of the outstanding stock of Eastern Capital Limited. Kenneth B. Dart is the beneficial owner of all of the outstanding stock of Portfolio Services Ltd. Kenneth B. Dart and Mark R. VanDevelde are directors of both Eastern Capital Limited and Portfolio Services Ltd. The address for these entities is 10 Market Street #773, Camana Bay, Grand Cayman, KY1-9006, Cayman Islands.

(6) Consists of shares held by Baxalta US Inc., a wholly owned subsidiary of Baxalta Incorporated. Baxalta Incorporated, as the ultimate parent of Baxalta US Inc., may be deemed to indirectly beneficially own such

shares. The address of Baxalta Incorporated and Baxalta US Inc. is One Baxter Parkway, Deerfield, Illinois 60015.

(7) Effective as of July 10, 2015, Corey Goodman resigned from our board of directors.

(8) Consists of: (i) 2,303,886 shares that may be acquired pursuant to the exercise of stock options within 60 days of June 30, 2015 by Dr. Lammers, (ii) 281,818 shares of common stock and (iii) 10,914,647 shares of our convertible preferred stock held by the State of Texas. The State of Texas has granted Dr. Lammers, through his position as our Chief Executive Officer, a revocable proxy of all of its voting rights.

(9) Includes an aggregate of 1,918,227 shares of preferred stock held by certain trusts for the benefit of members of Dr. Winkler's family. Dr. Winkler does not have voting or investment power with respect to such shares.

(10) Consists of: (i) 96,000 shares that may be acquired pursuant to the exercise of stock options within 60 days of June 30, 2015 by Mr. Alleva and (ii) 57,284 shares held by the Lawrence M. Alleva Profit Sharing Plan.

(11) Includes 27,417,439 shares held by entities affiliated with certain of our directors and 25,355,476 shares beneficially owned by our executive officers and directors, which includes 3,560,261 shares that may be acquired pursuant to the exercise of stock options within 60 days of June 30, 2015.

Description of Capital Stock

The following summary describes our capital stock and the material provisions of our amended and restated certificate of incorporation and our amended and restated bylaws, which will become effective immediately prior to the consummation of this offering, the investor rights agreement to which we and certain of our stockholders are parties and of the Delaware General Corporation Law. Because the following is only a summary, it does not contain all of the information that may be important to you. For a complete description, you should refer to our amended and restated certificate of incorporation, amended and restated bylaws and investor rights agreement, copies of which have been filed as exhibits to the registration statement of which this prospectus is part.

General

Immediately prior to the consummation of this offering, we will file our amended and restated certificate of incorporation that authorizes shares of common stock, $0.001 par value per share, and shares of preferred stock, $0.001 par value per share. The following information reflects the -for- reverse stock split of our capital stock we have effected, the filing of our amended and restated certificate of incorporation and the conversion of all outstanding shares of our preferred stock into shares of common stock immediately prior to the completion of this offering. As of June 30, 2015, there were outstanding:

- 153,801,422 shares of our common stock held by approximately 175 stockholders of record; and
- 12,280,909 shares of our common stock issuable upon exercise of outstanding stock options.

Common Stock

Voting Rights

Each holder of our common stock is entitled to one vote for each share on all matters submitted to a vote of the stockholders, including the election of directors. Our stockholders do not have cumulative voting rights in the election of directors. Accordingly, holders of a majority of the voting shares are able to elect all of the directors.

Dividends

Subject to preferences that may be applicable to any then outstanding preferred stock, holders of our common stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds.

Liquidation

In the event of our liquidation, dissolution or winding up, holders of our common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then outstanding shares of preferred stock.

Rights and Preferences

Holders of our common stock have no preemptive, conversion, subscription or other rights, and there are no redemption or sinking fund provisions applicable to our common stock. The rights, preferences and privileges of the holders of our common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of our preferred stock that we may designate in the future.

Fully Paid and Nonassessable.

All of our outstanding shares of common stock are, and the shares of common stock to be issued in this offering will be, fully paid and nonassessable.

Preferred Stock

Immediately prior to the consummation of this offering, all outstanding shares of our preferred stock will be converted into shares of our common stock. See Note 7 to our audited financial statements for a description of our currently outstanding preferred stock. Immediately prior to the consummation of this offering, our amended and restated certificate of incorporation will be amended and restated to delete all references to such shares of preferred stock. Upon the consummation of this offering, our board of directors will have the authority, without further action by our stockholders, to issue up to shares of preferred stock in one or more series and to fix the rights, preferences, privileges and restrictions thereof. These rights, preferences and privileges could include dividend rights, conversion rights, voting rights, terms of redemption, liquidation preferences, sinking fund terms and the number of shares constituting, or the designation of, such series, any or all of which may be greater than the rights of common stock. The issuance of our preferred stock could adversely affect the voting power of holders of common stock and the likelihood that such holders will receive dividend payments and payments upon our liquidation. In addition, the issuance of preferred stock could have the effect of delaying, deferring or preventing a change in control of our company or other corporate action. Immediately after consummation of this offering, no shares of preferred stock will be outstanding, and we have no present plan to issue any shares of preferred stock.

Registration Rights

Under our amended and restated investor rights agreement, following the closing of this offering, the holders of approximately 153.8 million shares of common stock or their transferees, have the right to require us to register their shares under the Securities Act so that those shares may be publicly resold, or to include their shares in any registration statement we file, in each case as described below.

Demand Registration Rights

Based on the number of shares outstanding as of June 30, 2015, after the consummation of this offering, the holders of approximately 152.4 million shares of our common stock issuable upon the conversion of our preferred stock, or their transferees, will be entitled to certain demand registration rights. Beginning after the earlier of October 22, 2015 or 180 days following the effectiveness of the registration statement of which this prospectus is a part, the holders of at least a majority of these shares can, on not more than two occasions, request that we register all or a portion of their shares. Such request for registration must cover at least 20% of these shares. Additionally, we will not be required to effect a demand registration during the period beginning 90 days prior to the filing of a company-initiated registration statement relating to a public offering of our securities, provided that we have complied with certain notice requirements to the holders of these shares.

Form S-3 Registration Rights

Based on the number of shares outstanding as of June 30, 2015, after the consummation of this offering, the holders of approximately 152.4 million shares of our common stock or their transferees, will be entitled to certain Form S-3 registration rights. The holders of these shares can make a written request that we register their shares on Form S-3 if we are eligible to file a registration statement on Form S-3 and if the aggregate price to the public of the shares offered is at least $1.0 million. These stockholders may make an unlimited number of requests for registration on Form S-3, but in no event shall we be required to file more than two registrations on Form S-3 in any 12 month period.

Additionally, we will not be required to effect a Form S-3 registration during the period beginning 90 days prior to the filing of a company-initiated registration statement relating to a public offering of our securities, provided that we have complied with certain notice requirements to the holders of these shares.

Piggyback Registration Rights

Based on the number of shares outstanding as of June 30, 2015, after the consummation of this offering, in the event that we determine to register any of our securities under the Securities Act (subject to certain exceptions), either for our own account or for the account of other security holders, the holders of approximately 152.4 million shares of our common stock or their transferees, will be entitled to certain "piggyback" registration rights allowing the holders to include their shares in such registration, subject to certain marketing and other limitations. As a result, whenever we propose to file a registration statement under the Securities Act, other than with respect to a registration related to employee benefit plans, the offer and sale of debt securities, or corporate reorganizations or certain other transactions, the holders of these shares are entitled to notice of the registration and have the right, subject to limitations that the underwriters may impose on the number of shares included in the registration, to include their shares in the registration. In an underwritten offering, the managing underwriter, if any, has the right, subject to specified conditions, to limit the number of shares such holders may include.

Expenses of Registration

We will pay the registration expenses of the holders of the shares registered pursuant to the demand, piggyback and Form S-3 registration rights described above, including the expenses of one counsel for the selling holders.

Expiration of Registration Rights.

The demand, piggyback and Form S-3 registration rights described above will expire, with respect to any particular stockholder, upon the earlier of three years after the consummation of this offering or when that stockholder can sell all of its shares during any 90-day period under Rule 144 of the Securities Act.

Anti-Takeover Effects of Provisions of our Amended and Restated Certificate of Incorporation, our Amended and Restated Bylaws and Delaware Law

Some provisions of Delaware law and our amended and restated certificate of incorporation and our amended and restated bylaws that will be in effect immediately prior to the consummation of this offering contain provisions that could make the following transactions more difficult: acquisition of us by means of a tender offer; acquisition of us by means of a proxy contest or otherwise; or removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions that might result in a premium over the market price for our shares.

These provisions, summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Delaware Anti-Takeover Statute

We are subject to Section 203 of the Delaware General Corporation Law, which prohibits persons deemed "interested stockholders" from engaging in a "business combination" with a publicly-held Delaware corporation for three years following the date these persons become interested stockholders unless the business combination is, or the transaction in which the person became an interested stockholder was, approved in a prescribed manner or another prescribed exception applies. Generally, an "interested stockholder" is a person who, together with affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation's voting stock. Generally, a "business combination" includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. The existence of this provision may have an anti-takeover effect with respect to transactions not approved in advance by the board of directors, such as discouraging takeover attempts that might result in a premium over the market price of our common stock.

Undesignated Preferred Stock

The ability to authorize undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change control of us. These and other provisions may have the effect of deterring hostile takeovers or delaying changes in control or management of our company.

Special Stockholder Meetings

Our amended and restated bylaws provide that a special meeting of stockholders may be called only by our chairman of the board of directors, Chief Executive Officer or President, or by a resolution adopted by a majority of our board of directors.

Requirements for Advance Notification of Stockholder Nominations and Proposals

Our amended and restated bylaws establish advance notice procedures with respect to stockholder proposals and the nomination of candidates for election as directors, other than nominations made by or at the direction of the board of directors or a committee of the board of directors.

Elimination of Stockholder Action by Written Consent

Our amended and restated certificate of incorporation eliminates the right of stockholders to act by written consent without a meeting.

Classified Board; Election and Removal of Directors

Our board of directors is divided into three classes. The directors in each class will serve for a three-year term, one class being elected each year by our stockholders, with staggered three-year terms. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. Because our stockholders do not have cumulative voting rights, our stockholders holding a majority of the shares of common stock outstanding will be able to elect all of our directors. For more information on the classified board, see "Management—Board Composition." This system of electing and removing directors may tend to discourage a third party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult for stockholders to replace a majority of the directors.

Choice of Forum

Our amended and restated certificate of incorporation will provide that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the exclusive forum for any derivative action or proceeding brought on our behalf; any action asserting a breach of fiduciary duty; any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our amended and restated certificate of incorporation or our bylaws; or any action asserting a claim against us that is governed by the internal affairs doctrine.

Amendment of Charter Provisions

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock, would require approval by holders of at least $66^{2}/_{3}\%$ of the voting power of our then outstanding voting stock.

The provisions of the Delaware General Corporation Law, our amended and restated certificate of incorporation and our amended and restated bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in our management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Limitations of Liability and Indemnification Matters

For a discussion of liability and indemnification, please see "Management—Limitation on Liability and Indemnification Matters."

The NASDAQ Global Market Listing

We have applied to list our common stock on The NASDAQ Global Market under the symbol "MIRN."

Transfer Agent and Registrar

Upon the completion of this offering, the transfer agent and registrar for our common stock will be American Stock Transfer & Trust, LLC. The transfer agent and registrar's address is 620 15th Avenue, Brooklyn, New York 11219.

Shares Eligible for Future Sale

Prior to this offering, there has been no public market for our common stock. Future sales of our common stock, including shares issued upon the exercise of outstanding options, in the public market after this offering, or the perception that those sales may occur, could cause the prevailing market price for our common stock to fall or impair our ability to raise equity capital in the future. As described below, only a limited number of shares of our common stock will be available for sale in the public market for a period of several months after consummation of this offering due to contractual and legal restrictions on resale described below. Future sales of our common stock in the public market either before (to the extent permitted) or after restrictions lapse, or the perception that those sales may occur, could adversely affect the prevailing market price of our common stock at such time and our ability to raise equity capital at a time and price we deem appropriate.

Sale of Restricted Shares

Based on the number of shares of our common stock outstanding as of June 30, 2015, upon the closing of this offering and assuming (1) the conversion of our outstanding preferred stock into common stock, assuming an initial public offering price of per share (the mid-point of the price range set forth on the cover page of this prospectus); (2) no exercise of the underwriters' option to purchase additional shares of common stock to cover over-allotments; and (3) no exercise of outstanding options, we will have outstanding an aggregate of approximately shares of common stock. Of these shares, all of the shares of common stock to be sold in this offering, and any shares sold upon exercise of the underwriters' option to purchase additional shares to cover over-allotments, will be freely tradable in the public market without restriction or further registration under the Securities Act, unless the shares are held by any of our "affiliates" as such term is defined in Rule 144 of the Securities Act. All remaining shares of common stock held by existing stockholders immediately prior to the consummation of this offering will be "restricted securities" as such term is defined in Rule 144. These restricted securities were issued and sold by us, or will be issued and sold by us, in private transactions and are eligible for public sale only if registered under the Securities Act or if they qualify for an exemption from registration under the Securities Act, including the exemptions provided by Rule 144 or Rule 701, which rules are summarized below.

As a result of the lock-up agreements referred to below and the provisions of Rule 144 and Rule 701 under the Securities Act, based on the number of shares of our common stock outstanding as of June 30, 2015, the shares of our common stock (excluding the shares sold in this offering) that will be available for sale in the public market are as follows:

Approximate Number of Shares	First Date Available for Sale into Public Market
shares	180 days after the date of this prospectus, or longer if the lock-up period is extended, upon expiration of the lock-up agreements referred to below, subject in some cases to applicable volume limitations under Rule 144

Lock-Up Agreements

In connection with this offering, we, our directors, our executive officers and substantially all of our other stockholders and option holders have agreed, subject to certain exceptions, with the underwriters not to dispose of or hedge any shares of our common stock or securities convertible into or exchangeable for shares of common stock during the period from the date of the lock-up agreement continuing through the date 180 days after the date of this prospectus, except with the prior written consent of Citigroup Global Markets Inc. and Leerink Partners LLC.

Following the lock-up periods set forth in the agreements described above, and assuming that the representatives of the underwriters do not release any parties from these agreements and that there is no extension of the lock-up period, all of the shares of our common stock that are restricted securities or are held by our affiliates as of the date of this prospectus will be eligible for sale in the public market in compliance with Rule 144 under the Securities Act.

Rule 144

In general, under Rule 144, as currently in effect, once we have been subject to the public company reporting requirements of the Securities Exchange Act of 1934, as amended, or the Exchange Act, for at least 90 days, a person (or persons whose shares are required to be aggregated) who is not deemed to have been one of our "affiliates" for purposes of Rule 144 at any time during the three months preceding a sale, and who has beneficially owned restricted securities within the meaning of Rule 144 for at least six months, including the holding period of any prior owner other than one of our "affiliates," is entitled to sell those shares in the public market (subject to the lock-up agreement referred to above, if applicable) without complying with the manner of sale, volume limitations or notice provisions of Rule 144, but subject to compliance with the public information requirements of Rule 144. If such a person has beneficially owned the shares proposed to be sold for at least one year, including the holding period of any prior owner other than "affiliates," then such person is entitled to sell such shares in the public market without complying with any of the requirements of Rule 144 (subject to the lock- up agreement referred to above, if applicable). In general, under Rule 144, as currently in effect, once we have been subject to the public company reporting requirements of the Exchange Act for at least 90 days, our "affiliates," as defined in Rule 144, who have beneficially owned the shares proposed to be sold for at least six months are entitled to sell in the public market, upon expiration of any applicable lock-up agreements and within any three-month period, a number of those shares of our common stock that does not exceed the greater of:

- 1% of the number of common shares then outstanding, which will equal approximately shares of common stock immediately after this offering (calculated as of June 30, 2015 on the basis of the assumptions described above and assuming no exercise of the underwriter's option to purchase additional shares and no exercise of outstanding options); or

- the average weekly trading volume of our common stock on The NASDAQ Global Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Such sales under Rule 144 by our "affiliates" or persons selling shares on behalf of our "affiliates" are also subject to certain manner of sale provisions, notice requirements and to the availability of current public information about us. Notwithstanding the availability of Rule 144, the holders of substantially all of our restricted securities have entered into lock-up agreements as referenced above and their restricted securities will become eligible for sale (subject to the above limitations under Rule 144) upon the expiration of the restrictions set forth in those agreements.

Rule 701

In general, under Rule 701 as currently in effect, any of our employees, directors, officers, consultants or advisors who acquired common stock from us in connection with a written compensatory stock or option plan or other written agreement in compliance with Rule 701 under the Securities Act before the effective date of the registration statement of which this prospectus is a part (to the extent such common stock is not subject to a lock-up agreement) is entitled to rely on Rule 701 to resell such shares beginning 90 days after we become subject to the public company reporting requirements of the Exchange Act in reliance on Rule 144, but without compliance with the holding period requirements contained in Rule 144. Accordingly, subject to any applicable lock-up agreements, beginning 90 days

after we become subject to the public company reporting requirements of the Exchange Act, under Rule 701 persons who are not our "affiliates," as defined in Rule 144, may resell those shares without complying with the minimum holding period or public information requirements of Rule 144, and persons who are our "affiliates" may resell those shares without compliance with Rule 144's minimum holding period requirements (subject to the terms of the lock-up agreement referred to below, if applicable).

Registration Rights

Based on the number of shares outstanding as of June 30, 2015, after the consummation of this offering, the holders of approximately 152.4 million shares of our common stock or their transferees, will, subject to any lock-up agreements they have entered into, be entitled to certain rights with respect to the registration of the offer and sale of those shares under the Securities Act. For a description of these registration rights, please see the section titled "Description of Capital Stock—Registration Rights." If the offer and sale of these shares are registered, they will be freely tradable without restriction under the Securities Act.

Stock Plans

We intend to file with the SEC a registration statement under the Securities Act covering the shares of common stock that we may issue upon exercise of certain outstanding options reserved for issuance under our 2008 Long Term Incentive Plan, as amended, and our 2015 Equity Incentive Award Plan. Such registration statement is expected to be filed and become effective as soon as practicable after the consummation of this offering. Accordingly, shares registered under such registration statement will be available for sale in the open market following its effective date, subject to Rule 144 volume limitations and the lock-up agreements described above, if applicable.

Material U.S. Federal Income Tax Consequences to Non-U.S. Holders

The following discussion is a summary of the material U.S. federal income tax consequences to Non-U.S. Holders (as defined below) of the purchase, ownership and disposition of our common stock issued pursuant to this offering, but does not purport to be a complete analysis of all potential tax effects. The effects of other U.S. federal tax laws, such as estate and gift tax laws, and any applicable state, local or non-U.S. tax laws are not discussed. This discussion is based on the U.S. Internal Revenue Code of 1986, as amended (the "Code"), Treasury Regulations promulgated thereunder, judicial decisions, and published rulings and administrative pronouncements of the U.S. Internal Revenue Service (the "IRS"), in each case in effect as of the date hereof. These authorities may change or be subject to differing interpretations. Any such change or differing interpretation may be applied retroactively in a manner that could adversely affect a Non-U.S. Holder. We have not sought and will not seek any rulings from the IRS regarding the matters discussed below. There can be no assurance the IRS or a court will not take a contrary position to that discussed below regarding the tax consequences of the purchase, ownership and disposition of our common stock.

This discussion is limited to Non-U.S. Holders that hold our common stock as a "capital asset" within the meaning of Section 1221 of the Code (generally, property held for investment). This discussion does not address all U.S. federal income tax consequences relevant to a Non-U.S. Holder's particular circumstances, including the impact of the Medicare contribution tax on net investment income. In addition, it does not address consequences relevant to Non-U.S. Holders subject to special rules, including, without limitation:

- U.S. expatriates and former citizens or long-term residents of the United States;
- persons subject to the alternative minimum tax;
- persons holding our common stock as part of a hedge, straddle or other risk reduction strategy or as part of a conversion transaction or other integrated investment;
- banks, insurance companies, and other financial institutions;
- brokers, dealers or traders in securities;
- "controlled foreign corporations," "passive foreign investment companies," and corporations that accumulate earnings to avoid U.S. federal income tax;
- partnerships or other entities or arrangements treated as partnerships for U.S. federal income tax purposes (and investors therein);
- tax-exempt organizations or governmental organizations;
- persons deemed to sell our common stock under the constructive sale provisions of the Code;
- persons who hold or receive our common stock pursuant to the exercise of any employee stock option or otherwise as compensation; and
- tax-qualified retirement plans.

If an entity treated as a partnership for U.S. federal income tax purposes holds our common stock, the tax treatment of a partner in the partnership will depend on the status of the partner, the activities of the partnership and certain determinations made at the partner level. Accordingly, partnerships holding our common stock and the partners in such partnerships should consult their tax advisors regarding the U.S. federal income tax consequences to them.

INVESTORS SHOULD CONSULT THEIR TAX ADVISORS WITH RESPECT TO THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS TO THEIR PARTICULAR

SITUATIONS AS WELL AS ANY TAX CONSEQUENCES OF THE PURCHASE, OWNERSHIP AND DISPOSITION OF OUR COMMON STOCK ARISING UNDER THE U.S. FEDERAL ESTATE OR GIFT TAX LAWS OR UNDER THE LAWS OF ANY STATE, LOCAL OR NON-U.S. TAXING JURISDICTION OR UNDER ANY APPLICABLE INCOME TAX TREATY.

Definition of a Non-U.S. Holder

For purposes of this discussion, a "Non-U.S. Holder" is any beneficial owner of our common stock that is neither a "U.S. person" nor an entity treated as a partnership for U.S. federal income tax purposes. A U.S. person is any person that, for U.S. federal income tax purposes, is or is treated as any of the following:

- an individual who is a citizen or resident of the United States;
- a corporation created or organized under the laws of the United States, any state thereof or the District of Columbia;
- an estate, the income of which is subject to U.S. federal income tax regardless of its source; or
- a trust that (1) is subject to the primary supervision of a U.S. court and all substantial decisions of which are subject to the control of one or more "United States persons" (within the meaning of Section 7701(a)(30) of the Code), or (2) has a valid election in effect to be treated as a United States person for U.S. federal income tax purposes.

Distributions

As described in the section entitled "Dividend Policy," we do not anticipate paying any cash dividends in the foreseeable future. However, if we do make distributions of cash or property on our common stock, such distributions will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. Amounts not treated as dividends for U.S. federal income tax purposes will constitute a return of capital and first be applied against and reduce a Non-U.S. Holder's adjusted tax basis in its common stock, but not below zero. Any excess will be treated as capital gain and will be treated as described below under "—Sale or Other Taxable Disposition."

Subject to the discussion below on effectively connected income, dividends paid to a Non-U.S. Holder will be subject to U.S. federal withholding tax at a rate of 30% of the gross amount of the dividends (or such lower rate specified by an applicable income tax treaty, provided the Non-U.S. Holder furnishes a valid IRS Form W-8BEN or W-8BEN-E (or other applicable documentation) certifying qualification for the lower treaty rate). A Non-U.S. Holder that does not timely furnish the required documentation, but that qualifies for a reduced treaty rate, may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. Non-U.S. Holders should consult their tax advisors regarding their entitlement to benefits under any applicable income tax treaty.

If dividends paid to a Non-U.S. Holder are effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such dividends are attributable), the Non-U.S. Holder will be exempt from the U.S. federal withholding tax described above. To claim the exemption, the Non-U.S. Holder must furnish to the applicable withholding agent a valid IRS Form W-8ECI, certifying that the dividends are effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States.

Any such effectively connected dividends will be subject to U.S. federal income tax on a net income basis at the regular graduated rates. A Non-U.S. Holder that is a corporation also may be

subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected dividends, as adjusted for certain items. Non-U.S. Holders should consult their tax advisors regarding any applicable tax treaties that may provide for different rules.

Sale or Other Taxable Disposition

A Non-U.S. Holder will not be subject to U.S. federal income tax on any gain realized upon the sale or other taxable disposition of our common stock unless:

- the gain is effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such gain is attributable);
- the Non-U.S. Holder is a nonresident alien individual present in the United States for 183 days or more during the taxable year of the disposition and certain other requirements are met; or
- our common stock constitutes a U.S. real property interest ("USRPI") by reason of our status as a U.S. real property holding corporation ("USRPHC") for U.S. federal income tax purposes.

Gain described in the first bullet point above generally will be subject to U.S. federal income tax on a net income basis at the regular graduated rates. A Non-U.S. Holder that is a corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected gain, as adjusted for certain items.

Gain described in the second bullet point above will be subject to U.S. federal income tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty), which may be offset by certain U.S. source capital losses of the Non-U.S. Holder (even though the individual is not considered a resident of the United States), provided the Non-U.S. Holder has timely filed U.S. federal income tax returns with respect to such losses.

With respect to the third bullet point above, we believe we currently are not, and do not anticipate becoming, a USRPHC. Because the determination of whether we are a USRPHC depends, however, on the fair market value of our USRPIs relative to the fair market value of our non-U.S. real property interests and our other business assets, there can be no assurance we currently are not a USRPHC or will not become one in the future. Even if we are or were to become a USRPHC, gain arising from the sale or other taxable disposition by a Non-U.S. Holder of our common stock will not be subject to U.S. federal income tax if our common stock is "regularly traded," as defined by applicable Treasury Regulations, on an established securities market, and such Non-U.S. Holder owned, actually and constructively, 5% or less of our common stock throughout the shorter of the five-year period ending on the date of the sale or other taxable disposition or the Non-U.S. Holder's holding period.

Non-U.S. Holders should consult their tax advisors regarding any applicable tax treaties that may provide for different rules.

Information Reporting and Backup Withholding

Payments of dividends on our common stock will not be subject to backup withholding, provided the applicable withholding agent does not have actual knowledge or reason to know the holder is a United States person and the holder either certifies its non-U.S. status, such as by furnishing a valid IRS Form W-8BEN, W-8BEN-E or W-8ECI, or otherwise establishes an exemption. However, information returns are required to be filed with the IRS in connection with any dividends on our common stock paid to the Non-U.S. Holder, regardless of whether any tax was actually withheld. In addition, proceeds of the sale or other taxable disposition of our common stock within the United

States or conducted through certain U.S.-related brokers generally will not be subject to backup withholding or information reporting, if the applicable withholding agent receives the certification described above and does not have actual knowledge or reason to know that such holder is a United States person, or the holder otherwise establishes an exemption. Proceeds of a disposition of our common stock conducted through a non-U.S. office of a non-U.S. broker that does not have certain enumerated relationships with the United States generally will not be subject to backup withholding or information reporting.

Copies of information returns that are filed with the IRS may also be made available under the provisions of an applicable treaty or agreement to the tax authorities of the country in which the Non-U.S. Holder resides or is established.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules may be allowed as a refund or a credit against a Non-U.S. Holder's U.S. federal income tax liability, provided the required information is timely furnished to the IRS.

Additional Withholding Tax on Payments Made to Foreign Accounts

Withholding taxes may be imposed under Sections 1471 to 1474 of the Code (such Sections commonly referred to as the Foreign Account Tax Compliance Act, or "FATCA") on certain types of payments made to non-U.S. financial institutions and certain other non-U.S. entities. Specifically, a 30% withholding tax will be imposed on dividends on, or gross proceeds from the sale or other disposition after December 31, 2016 of, our common stock paid to a "foreign financial institution" or a "non-financial foreign entity" (each as defined in the Code), unless (1) the foreign financial institution undertakes certain diligence and reporting obligations, (2) the non-financial foreign entity either certifies it does not have any "substantial United States owners" (as defined in the Code) or furnishes identifying information regarding each substantial United States owner, or (3) the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from these rules. If the payee is a foreign financial institution and is subject to the diligence and reporting requirements in (1) above, it must enter into an agreement with the U.S. Department of the Treasury requiring, among other things, that it undertake to identify accounts held by certain "specified United States persons" or "United States-owned foreign entities" (each as defined in the Code), annually report certain information about such accounts, and withhold 30% on certain payments to non-compliant foreign financial institutions and certain other account holders. Foreign financial institutions located in jurisdictions that have an intergovernmental agreement with the United States governing FATCA may be subject to different rules.

Prospective investors should consult their tax advisors regarding the potential application of withholding under FATCA to their investment in our common stock.

Underwriting

Citigroup Global Markets Inc. and Leerink Partners LLC are acting as representatives of each of the underwriters named below. Subject to the terms and conditions set forth in an underwriting agreement among us and the underwriters, we have agreed to sell to the underwriters, and each of the underwriters has agreed, severally and not jointly, to purchase from us, the number of shares of common stock set forth opposite its name below.

Underwriter	Number of Shares
Citigroup Global Markets Inc.	
Leerink Partners LLC	
Oppenheimer & Co. Inc.	
Cantor Fitzgerald & Co.	
Total	

Subject to the terms and conditions set forth in the underwriting agreement, the underwriters have agreed, severally and not jointly, to purchase all of the shares sold under the underwriting agreement if any of these shares are purchased. If an underwriter defaults, the underwriting agreement provides that the purchase commitments of the non-defaulting underwriters may be increased or the underwriting agreement may be terminated.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, or to contribute to payments the underwriters may be required to make in respect of those liabilities.

The underwriters are offering the shares, subject to prior sale, when, as and if issued to and accepted by them, subject to approval of legal matters by their counsel, including the validity of the shares, and other conditions contained in the underwriting agreement, such as the receipt by the underwriters of officers' certificates and legal opinions. The underwriters reserve the right to withdraw, cancel or modify offers to the public and to reject orders in whole or in part.

Commissions and Discounts

The representatives have advised us that the underwriters propose initially to offer the shares to the public at the public offering price set forth on the cover of this prospectus and to dealers at that price less a concession not in excess of $ per share. After the initial offering, the public offering price, concession or any other term of the offering may be changed.

The following table shows the public offering price, underwriting discount and proceeds before expenses to us. The information assumes either no exercise or full exercise by the underwriters of their option to purchase additional shares of our common stock.

	Per Share	Without Option	With Option
Public offering price	$	$	$
Underwriting discount	$	$	$
Proceeds, before expenses, to us	$	$	$

The expenses of the offering, not including the underwriting discount, are estimated at $ million and are payable by us. We have agreed to reimburse the underwriters for expenses relating to the clearing of this offering with the Financial Regulatory Authority and the qualification of our common stock under state securities laws (in an amount not to exceed $35,000 in the aggregate).

Option to Purchase Additional Shares

We have granted an option to the underwriters, exercisable for 30 days after the date of this prospectus, to purchase up to additional shares at the public offering price, less the underwriting discount. If the underwriters exercise this option, each will be obligated, subject to conditions contained in the underwriting agreement, to purchase a number of additional shares proportionate to that underwriter's initial amount reflected in the above table.

No Sales of Similar Securities

We, our executive officers and directors and substantially all of our other existing security holders have agreed not to sell or transfer any common stock or securities convertible into or exchangeable or exercisable for common stock, for 180 days after the date of this prospectus without first obtaining the written consent of Citigroup Global Markets Inc. and Leerink Partners LLC. Specifically, we and these other persons have agreed, with certain limited exceptions, not to directly or indirectly:

- offer, pledge, sell or contract to sell any common stock;
- sell any option or contract to purchase any common stock;
- purchase any option or contract to sell any common stock;
- grant any option, right or warrant for the sale of any common stock;
- otherwise dispose of or transfer any common stock;
- request or demand that we file a registration statement related to the common stock; or
- enter into any swap or other agreement or any transaction that transfers, in whole or in part, the economic consequence of ownership of any common stock, whether any such swap, agreement or transaction is to be settled by delivery of shares or other securities, in cash or otherwise.

This lock-up provision applies to common stock and to securities convertible into or exchangeable or exercisable for common stock. It also applies to common stock owned now or acquired later by the person executing the agreement or for which the person executing the agreement later acquires the power of disposition.

NASDAQ Global Market Listing

We have applied to list our common stock on The NASDAQ Global Market under the symbol "MIRN."

Before this offering, there has been no public market for our common stock. The initial public offering price will be determined through negotiations between us and the representatives. In addition to prevailing market conditions, the factors to be considered in determining the initial public offering price are:

- the valuation multiples of publicly traded companies that the representatives believe to be comparable to us;
- our financial information;
- the history of, and the prospects for, our company and the industry in which we compete;
- an assessment of our management, its past and present operations, and the prospects for, and timing of, our future revenues;
- the present state of our development; and

- the above factors in relation to market values and various valuation measures of other companies engaged in activities similar to ours.

An active trading market for the shares may not develop. It is also possible that after the offering the shares will not trade in the public market at or above the initial public offering price.

The underwriters do not expect to sell more than 5% of the shares in the aggregate to accounts over which they exercise discretionary authority.

Price Stabilization, Short Positions and Penalty Bids

Until the distribution of the shares is completed, SEC rules may limit underwriters and selling group members from bidding for and purchasing our common stock. However, the representatives may engage in transactions that stabilize the price of the common stock, such as bids or purchases to peg, fix or maintain that price.

In connection with the offering, the underwriters may purchase and sell our common stock in the open market. These transactions may include short sales, purchases on the open market to cover positions created by short sales and stabilizing transactions. Short sales involve the sale by the underwriters of a greater number of shares than they are required to purchase in the offering. "Covered" short sales are sales made in an amount not greater than the underwriters' option described above. The underwriters may close out any covered short position by either exercising their option or purchasing shares in the open market. In determining the source of shares to close out the covered short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase shares through the option granted to them. "Naked" short sales are sales in excess of such option. The underwriters must close out any naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of our common stock in the open market after pricing that could adversely affect investors who purchase in the offering. Stabilizing transactions consist of various bids for or purchases of shares of common stock made by the underwriters in the open market prior to the completion of the offering.

The underwriters may also impose a penalty bid. This occurs when a particular underwriter repays to the underwriters a portion of the underwriting discount received by it because the representatives have repurchased shares sold by or for the account of such underwriter in stabilizing or short covering transactions.

Similar to other purchase transactions, the underwriters' purchases to cover the syndicate short sales may have the effect of raising or maintaining the market price of our common stock or preventing or retarding a decline in the market price of our common stock. As a result, the price of our common stock may be higher than the price that might otherwise exist in the open market. The underwriters may conduct these transactions on The NASDAQ Global Market, in the over-the-counter market or otherwise.

Neither we nor any of the underwriters make any representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the price of our common stock. In addition, neither we nor any of the underwriters make any representation that the representatives will engage in these transactions or that these transactions, once commenced, will not be discontinued without notice.

Electronic Distribution

In connection with the offering, certain of the underwriters or securities dealers may distribute prospectuses by electronic means, such as e-mail.

Other Relationships

Some of the underwriters and their affiliates may in the future engage in investment banking and other commercial dealings in the ordinary course of business with us or our affiliates. They may in the future receive customary fees and commissions for these transactions.

In addition, in the ordinary course of their business activities, the underwriters and their affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers. Such investments and securities activities may involve securities and/or instruments of ours or our affiliates. The underwriters and their affiliates may also make investment recommendations and/or publish or express independent research views in respect of such securities or financial instruments and may hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

Notice to Prospective Investors in the European Economic Area

In relation to each Member State of the European Economic Area (each, a "Relevant Member State"), no offer of shares may be made to the public in that Relevant Member State other than:

(a) to any legal entity which is a qualified investor as defined in the Prospectus Directive;

(b) to fewer than 100 or, if the Relevant Member State has implemented the relevant provision of the 2010 PD Amending Directive, 150, natural or legal persons (other than qualified investors as defined in the Prospectus Directive), as permitted under the Prospectus Directive, subject to obtaining the prior consent of the representatives; or

(c) in any other circumstances falling within Article 3(2) of the Prospectus Directive, provided that no such offer of shares shall require the Company or the representatives to publish a prospectus pursuant to Article 3 of the Prospectus Directive or supplement a prospectus pursuant to Article 16 of the Prospectus Directive.

Each person in a Relevant Member State who initially acquires any shares or to whom any offer is made will be deemed to have represented, acknowledged and agreed that it is a "qualified investor" within the meaning of the law in that Relevant Member State implementing Article 2(1)(e) of the Prospectus Directive. In the case of any shares being offered to a financial intermediary as that term is used in Article 3(2) of the Prospectus Directive, each such financial intermediary will be deemed to have represented, acknowledged and agreed that the shares acquired by it in the offer have not been acquired on a non-discretionary basis on behalf of, nor have they been acquired with a view to their offer or resale to, persons in circumstances which may give rise to an offer of any shares to the public other than their offer or resale in a Relevant Member State to qualified investors as so defined or in circumstances in which the prior consent of the representatives has been obtained to each such proposed offer or resale.

The Company, the representatives and their affiliates will rely upon the truth and accuracy of the foregoing representations, acknowledgements and agreements.

This prospectus has been prepared on the basis that any offer of shares in any Relevant Member State will be made pursuant to an exemption under the Prospectus Directive from the requirement to publish a prospectus for offers of shares. Accordingly any person making or intending to make an offer in that Relevant Member State of shares which are the subject of the offering contemplated in this prospectus may only do so in circumstances in which no obligation arises for the Company or any of the underwriters to publish a prospectus pursuant to Article 3 of the Prospectus Directive in relation to such offer. Neither the Company nor the underwriters have authorized, nor do they authorize, the

making of any offer of shares in circumstances in which an obligation arises for the Company or the underwriters to publish a prospectus for such offer.

For the purpose of the above provisions, the expression "an offer to the public" in relation to any shares in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase or subscribe the shares, as the same may be varied in the Relevant Member State by any measure implementing the Prospectus Directive in the Relevant Member State and the expression "Prospectus Directive" means Directive 2003/71/EC (including the 2010 PD Amending Directive, to the extent implemented in the Relevant Member States) and includes any relevant implementing measure in the Relevant Member State and the expression "2010 PD Amending Directive" means Directive 2010/73/EU.

Notice to Prospective Investors in the United Kingdom

In addition, in the United Kingdom, this document is being distributed only to, and is directed only at, and any offer subsequently made may only be directed at persons who are "qualified investors" (as defined in the Prospectus Directive) (i) who have professional experience in matters relating to investments falling within Article 19 (5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended, or the Order, and/or (ii) who are high net worth companies (or persons to whom it may otherwise be lawfully communicated) falling within Article 49(2)(a) to (d) of the Order (all such persons together being referred to as "relevant persons"). This document must not be acted on or relied on in the United Kingdom by persons who are not relevant persons. In the United Kingdom, any investment or investment activity to which this document relates is only available to, and will be engaged in with, relevant persons.

Notice to Prospective Investors in Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange, or SIX, or on any other stock exchange or regulated trading facility in Switzerland. This document has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company or the shares have been or will be filed with or approved by any Swiss regulatory authority. In particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA (FINMA), and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes, or CISA. The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Legal Matters

The validity of the issuance of our common stock offered in this prospectus will be passed upon for us by Latham & Watkins LLP, Menlo Park, California. Certain legal matters in connection with this offering will be passed upon for the underwriters by Ropes & Gray LLP, San Francisco, California.

Experts

Ernst & Young LLP, independent registered public accounting firm, has audited our financial statements as of December 31, 2013 and 2014 and for each of the three years in the period ended December 31, 2014, as set forth in their report. We have included our financial statements in the prospectus and elsewhere in the registration statement in reliance on the reports of Ernst & Young LLP, an independent registered public accounting firm, given on their authority as experts in accounting and auditing.

Where You Can Find More Information

We have filed with the SEC a registration statement on Form S-1 under the Securities Act with respect to the shares of common stock offered hereby. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth in the registration statement or the exhibits and schedules filed therewith. For further information with respect to Mirna Therapeutics, Inc. and the common stock offered hereby, reference is made to the registration statement and the exhibits and schedules filed therewith. Statements contained in this prospectus regarding the contents of any contract or any other document that is filed as an exhibit to the registration statement are not necessarily complete, and each such statement is qualified in all respects by reference to the full text of such contract or other document filed as an exhibit to the registration statement. A copy of the registration statement and the exhibits and schedules filed therewith may be inspected without charge at the public reference room maintained by the SEC, located at 100 F Street N.E., Room 1580, Washington, D.C. 20549, and copies of all or any part of the registration statement may be obtained from such offices upon the payment of the fees prescribed by the SEC. Please call the SEC at 1-800-SEC-0330 for further information about the public reference room. The SEC also maintains a website that contains reports, proxy and information statements and other information regarding registrants that file electronically with the SEC. The address is www.sec.gov.

Upon consummation of this offering, we will become subject to the information and periodic reporting requirements of the Securities Exchange Act of 1934, as amended, or the Exchange Act, and, in accordance therewith, will file periodic reports, proxy statements and other information with the SEC. Such periodic reports, proxy statements and other information will be available for inspection and copying at the public reference room and website of the SEC referred to above. We maintain a website at www.mirnarx.com. Upon consummation of this offering, you may access our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act with the SEC free of charge at our website as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC. The reference to our website address does not constitute incorporation by reference of the information contained on our website, and you should not consider the contents of our website in making an investment decision with respect to our common stock.

MIRNA THERAPEUTICS, INC.

Index to Financial Statements

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders
Mirna Therapeutics, Inc.

We have audited the accompanying balance sheets of Mirna Therapeutics, Inc. (the "Company") as of December 31, 2014 and 2013, and the related statements of operations, stockholders' deficit and cash flows for each of the three years in the period ended December 31, 2014. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. We were not engaged to perform an audit of the Company's internal control over financial reporting. Our audits included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Mirna Therapeutics, Inc. at December 31, 2014 and 2013, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2014 in conformity with U.S. generally accepted accounting principles.

/s/ Ernst & Young LLP

Austin, Texas
July 15, 2015

MIRNA THERAPEUTICS, INC.

Balance Sheets

(in thousands, except share and per share data)

	December 31, 2013	December 31, 2014	June 30, 2015 (unaudited)	Pro Forma Stockholders' Equity June 30, 2015 (unaudited)
Assets				
Current Assets:				
Cash and cash equivalents	$ 23,182	$ 9,319	$ 41,579	
Grant reimbursement and other receivables	195	155	26	
Prepaid expenses and other current assets	44	143	300	
Total current assets	23,421	9,617	41,905	
Property and equipment, net	49	116	149	
Deferred offering costs	197	92	133	
Other noncurrent assets	17	—	—	
Total assets	$ 23,684	$ 9,825	$ 42,187	
Liabilities, Convertible Preferred Stock and Stockholders' Deficit				
Current Liabilities:				
Accounts payable	$ 682	$ 871	$ 1,466	
Accrued expenses	463	1,628	1,630	
Total liabilities	1,145	2,499	3,096	
Commitments and contingencies (Note 14)				
Convertible preferred stock, $0.001 par value; 84,000,783 shares authorized at December 31, 2014; 157,650,538 shares authorized at June 30, 2015 (unaudited):				
Series A: 3,192,083 shares designated; 3,192,083 shares issued and outstanding at December 31, 2013 and 2014 and June 30, 2015 (unaudited); no shares issued and outstanding pro forma as of June 30, 2015 (unaudited); aggregate liquidation preference of $6.4 million at December 31, 2014 and June 30, 2015 (unaudited)	6,384	6,384	6,384	$ —
Series B: 540,341 shares designated; 540,341 shares issued and outstanding at December 31, 2013 and 2014 and June 30, 2015 (unaudited); no shares issued and outstanding pro forma as of June 30, 2015 (unaudited); aggregate liquidation preference of $1.5 million at December 31, 2014 and June 30, 2015 (unaudited)	1,500	1,500	1,500	—
Series B-1: 10,914,647 shares designated; 10,914,647 shares issued and outstanding at December 31, 2013 and 2014 and June 30, 2015 (unaudited); no shares issued and outstanding pro forma as of June 30, 2015 (unaudited); aggregate liquidation preference of $7.5 million at December 31, 2014 and June 30, 2015 (unaudited)	7,498	7,498	7,498	—
Series C: 69,353,712 shares designated; 69,353,695 shares issued and outstanding at December 31, 2013 and 2014, and June 30, 2015 (unaudited); no shares issued and outstanding pro forma as of June 30, 2015 (unaudited); aggregate liquidation preference of $39.9 million at December 31, 2014 and $41.3 million at June 30, 2015 (unaudited)	37,071	39,895	41,295	—
Series D: 733,649,755 shares designated (unaudited); No shares issued and outstanding at December 31, 2013 and 2014, 68,395,299 shares issued and outstanding at June 30, 2015 (unaudited); no shares issued and outstanding pro forma as of June 30, 2015 (unaudited); aggregate liquidation preference of $42.6 million at June 30, 2015 (unaudited)	—	—	42,604	—
Stockholders' Deficit:				
Common stock, $0.001 par value; 95,000,000 shares authorized at December 31, 2014; 175,100,000 shares authorized at June 30, 2015 (unaudited); 30,999 and 1,250,291 shares issued and outstanding at December 31, 2013 and 2014, respectively, 1,405,357 shares issued and outstanding at June 30, 2015 (unaudited); 153,801,422 shares issued and outstanding pro forma as of June 30, 2015 (unaudited)	—	1	1	154
Additional paid-in capital	890	—	—	99,128
Accumulated deficit	(30,804)	(47,952)	(60,191)	(60,191)
Total stockholders' (deficit) equity	(29,914)	(47,951)	(60,190)	$ 39,091
Total liabilities, convertible preferred stock and stockholders' deficit	$ 23,684	$ 9,825	$ 42,187	

See accompanying notes.

MIRNA THERAPEUTICS, INC.

Statements of Operations

(in thousands, except share and per share data)

	Year Ended December 31,			Six Months Ended June 30,	
	2012	2013	2014	2014	2015
				(unaudited)	
Operating expenses:					
Research and development	$ 2,742	$ 4,391	$ 10,545	$ 4,256	$ 7,924
General and administrative	1,562	2,384	3,369	1,777	2,039
Write-off of offering costs	—	—	1,920	—	—
Total operating expenses	4,304	6,775	15,834	6,033	9,963
Other income (expense):					
Change in fair value of option liability	—	339	—	—	—
Gain on extinguishment of note payable	1,001	—	—	—	—
Interest expense	(355)	—	—	—	—
Total other income (expense)	646	339	—	—	—
Net loss	$ (3,658)	$ (6,436)	$ (15,834)	$ (6,033)	$ (9,963)
Less: Accretion and dividends on convertible preferred stock	(6,142)	(2,324)	(2,824)	(1,400)	(2,662)
Net loss attributable to common stockholders	$ (9,800)	$ (8,760)	$ (18,658)	$ (7,433)	$ (12,625)
Net loss per share attributable to common stockholders—basic and diluted	$ (373.52)	$ (293.92)	$ (19.40)	$ (11.09)	$ (9.34)
Common shares used to compute basic and diluted net loss per share attributable to common stockholders	26,237	29,804	961,963	670,035	1,351,526
Pro forma net loss per common share (unaudited)—basic and diluted			$ (0.19)		$ (0.08)
Common shares used to compute pro forma net loss per share (unaudited)—basic and diluted			84,962,729		118,952,196

See accompanying notes.

MIRNA THERAPEUTICS, INC.

Statements of Stockholders' Deficit

(in thousands, except share amounts)

	Common Stock		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Deficit
	Shares	Amount			
Balance at January 1, 2012	25,306	$ —	$ —	$ (14,595)	$ (14,595)
Exercise of stock options	2,276	—	1	—	1
Stock-based compensation	—	—	24	—	24
Accretion of convertible preferred stock	—	—	(25)	(5,838)	(5,863)
Series C dividends	—	—	—	(277)	(277)
Net loss	—	—	—	(3,658)	(3,658)
Balance at December 31, 2012	27,582	—	—	(24,368)	(24,368)
Exercise of stock options	3,417	—	1	—	1
Stock-based compensation	—	—	163	—	163
Reclassification of option liability	—	—	3,050	—	3,050
Accretion of convertible preferred stock (unaudited)	—	—	(831)	—	(831)
Series C dividends	—	—	(1,493)	—	(1,493)
Net loss	—	—	—	(6,436)	(6,436)
Balance at December 31, 2013	30,999	—	890	(30,804)	(29,914)
Exercise of stock options	1,212,570	1	208	—	209
Issuance of common stock	6,722	—	4	—	4
Stock-based compensation	—	—	408	—	408
Series C dividends	—	—	(1,510)	(1,314)	(2,824)
Net loss	—	—	—	(15,834)	(15,834)
Balance at December 31, 2014	1,250,291	1	—	(47,952)	(47,951)
Exercise of stock options (unaudited)	155,066	—	35	—	35
Stock-based compensation (unaudited)	—	—	351	—	351
Accretion of convertible preferred stock (unaudited)	—	—	(181)	(267)	(448)
Series C and Series D dividends (unaudited)	—	—	(205)	(2,009)	(2,214)
Net loss (unaudited)	—	—	—	(9,963)	(9,963)
Balance at June 30, 2015 (unaudited)	1,405,357	$ 1	$ —	$ (60,191)	$ (60,190)

See accompanying notes.

MIRNA THERAPEUTICS, INC.

Statements of Cash Flows

(in thousands)

	Year Ended December 31,			Six Months Ended June 30,	
	2012	2013	2014	2014	2015
				(unaudited)	
Operating activities					
Net loss	$ (3,658)	$ (6,436)	$ (15,834)	$ (6,033)	$ (9,963)
Adjustment to reconcile net loss to net cash used in operating activities:					
Depreciation and amortization	37	36	35	17	25
Stock-based compensation	24	163	408	186	351
Issuance of stock for services	—	—	4	4	—
Gain on extinguishment of note payable	(1,001)	—	—	—	—
Change in fair value of option liability	—	(339)	—	—	—
Changes in operating assets and liabilities:					
Grant reimbursement and other receivables	(315)	121	40	13	129
Prepaid expenses and other current assets	(25)	2	(99)	(112)	(69)
Deferred offering costs	—	(197)	105	(1,770)	—
Other noncurrent assets	—	(17)	17	—	—
Accounts payable	721	(132)	189	(240)	326
Accrued expenses	48	303	1,165	524	2
Deferred grant reimbursement	(351)	—	—	—	—
Net cash used in operating activities	(4,520)	(6,496)	(13,970)	(7,411)	(9,199)
Investing activities					
Purchase of property and equipment	—	(7)	(102)	(21)	(58)
Net cash used in investing activities	—	(7)	(102)	(21)	(58)
Financing activities					
Proceeds from issuance of convertible preferred stock and option to purchase convertible preferred stock	16,096	16,418	—	—	41,482
Proceeds from exercise of stock options	1	1	209	208	35
Net proceeds from bridge notes from related parties	750	—	—	—	—
Cash provided by financing activities	16,847	16,419	209	208	41,517
Net increase (decrease) in cash and cash equivalents	12,327	9,916	(13,863)	(7,224)	32,260
Cash and cash equivalents at beginning of year	939	13,266	23,182	23,182	9,319
Cash and cash equivalents at end of year	$ 13,266	$ 23,182	$ 9,319	$ 15,958	$ 41,579
Supplemental disclosure of non-cash investing activities					
Conversion of note payable to convertible preferred stock	$ 750	$ —	$ —	$ —	$ —

See accompanying notes.

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements

1. Nature of Business and Basis of Presentation

Nature of business

Mirna Therapeutics, Inc. ("Mirna" or "the Company") is a clinical stage biopharmaceutical company developing a broad pipeline of microRNA-based oncology therapeutics. The Company was incorporated in Delaware in December 2007 as a wholly-owned subsidiary of Asuragen, Inc. ("Asuragen") and was spun out to existing Asuragen stockholders in December 2009. The Company is located in Austin, Texas.

Basis of presentation

The Company continues to be subject to a number of risks common to companies in similar stages of development. Principal among these risks are the uncertainties of technological innovations, dependence on key individuals, development of the same or similar technological innovations by the Company's competitors and protection of proprietary technology. The Company's ability to fund its planned clinical operations, including completion of its planned trials, is expected to depend on the amount and timing of cash receipts from future collaboration or product sales and/or financing transactions. The Company believes that its cash and cash equivalents of $9.3 million at December 31, 2014, plus the proceeds from a subsequent offering of the Company's Series D preferred stock completed in April 2015 (see Note 17), will enable the Company to maintain its current and planned operations for the foreseeable future.

Recent accounting pronouncements

In June 2014, the Financial Accounting Standards Board, or FASB, issued ASU 2014-10, *Elimination of Certain Financial Reporting Requirements, Including an Amendment to Variable Interest Entities Guidance in Topic 810 Consolidation*. These updates remove the definition of a development stage entity from the Master Glossary of the Accounting Standards Codification, thereby removing the financial reporting distinction between development stage entities and other reporting entities from U.S. GAAP. In addition, the amendments eliminate the requirements for development stage entities to (1) present inception-to-date information in the statements of income, cash flows, and shareholder equity, (2) label the financial statements as those of a development stage entity, (3) disclose a description of the development stage activities in which the entity is engaged, and (4) disclose in the first year in which the entity is no longer a development stage entity that in prior years it had been in the development stage. This standard is effective for annual reporting periods beginning after December 15, 2014. We have early adopted this standard in the presentation of our 2014 financial statements.

2. Summary of Significant Accounting Policies

Unaudited pro forma financial information

On March 10, 2014, the Company's board of directors authorized management of the Company to submit on a confidential basis a registration statement with the Securities and Exchange Commission ("SEC") for the Company to sell shares of its common stock to the public. Upon the closing of a qualified initial public offering, all of the Company's outstanding convertible preferred stock will automatically convert into common stock. The unaudited pro forma stockholders' equity as of June 30, 2015 assumes the conversion of all outstanding convertible preferred stock into shares of common stock upon the completion of this proposed offering. The unaudited pro forma stockholders' equity excludes

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

shares of common stock issuable to holders of Series C and Series D convertible preferred stock as a result of the accrued paid in-kind dividends in connection with the conversion of all shares of Series C and Series D convertible preferred stock.

Unaudited pro forma net loss per share attributable to common stockholders is computed using the weighted-average number of common shares outstanding after giving effect to the conversion of all convertible preferred stock into shares of common stock as if such conversion had occurred at the beginning of the period presented, or the date of original issuance, if later. Accordingly, the pro forma basic and diluted net loss per share attributable to common stockholders excludes the accretion to redemption value and accretion of cumulative convertible preferred stock dividends. The pro forma basic and diluted net loss per share attributable to common stockholders excludes the effect of shares of common stock issuable to holders of Series C and Series D convertible preferred stock as a result of the accrued paid in-kind dividends in connection with the conversion of all shares of Series C and Series D convertible preferred stock.

Use of estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires the Company's management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results could differ from those estimates.

The Company utilizes significant estimates and assumptions in determining the fair value of its common stock. The board of directors determined the estimated fair value of the Company's common stock based on a number of objective and subjective factors, including external market conditions affecting the biotechnology industry sector and the prices at which the Company sold shares of convertible preferred stock, the superior rights and preferences of securities senior to its common stock at the time and the likelihood of achieving a liquidity event, such as an initial public offering or sale of the Company.

The Company utilized various valuation methodologies in accordance with the framework of the American Institute of Certified Public Accountants, or AICPA, Audit and Accounting Practice Aid Series: *Valuation of Privately Held Company Equity Securities Issued as Compensation*, or the AICPA Practice Aid, to estimate the fair value of its common stock. The methodologies included the Option Pricing Method utilizing the Backsolve Method (a form of the market approach defined in the AICPA Practice Aid) and the Probability-Weighted Expected Return Method based upon the probability of occurrence of certain future liquidity events such as an initial public offering or sale of the Company. Each valuation methodology includes estimates and assumptions that require the Company's judgment. Significant changes to the key assumptions used in the valuations could result in different fair values of common stock at each valuation date.

Research and development costs

Research and development costs are expensed as incurred. Research and development costs include salaries and personnel-related costs, consulting fees, fees paid for contract research services, the costs of laboratory equipment and facilities, license fees and other external costs. The Company accounts for government grants as a reduction of research and development expenses. Government grants are recorded at the time the related research and development costs have been paid by the

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

Company and, accordingly, become eligible for reimbursement. The Company accrues for government grants that have been earned but not yet received.

Nonrefundable advance payments for goods or services to be received in the future for use in research and development activities are deferred and capitalized. The capitalized amounts are expensed as the related goods are delivered or the services are performed.

Stock-based compensation

The Company accounts for its stock-based compensation awards in accordance with ASC Topic 718, *Compensation—Stock Compensation* ("ASC 718"). ASC 718 requires all stock-based payments to employees, including grants of employee stock options, to be recognized in the statements of operations based on their grant date fair values. For stock options granted to employees and to members of the board of directors for their services on the board of directors, the Company estimates the grant date fair value of each option award using the Black-Scholes option-pricing model. The use of the Black-Scholes option-pricing model requires management to make assumptions with respect to the expected term of the option, the expected volatility of the common stock consistent with the expected life of the option, risk-free interest rates and expected dividend yields of the common stock. For awards subject to service-based vesting conditions, the Company recognizes stock-based compensation expense, net of estimated forfeitures, equal to the grant date fair value of stock options on a straight-line basis over the requisite service period.

During the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2015 (unaudited), the Company recorded stock-based compensation expense for employee stock options, which was allocated as follows in the statements of operations (in thousands):

	Year Ended December 31,			Six Months Ended June 30, 2015 (unaudited)
	2012	2013	2014	
Research and development expense	$ 6	$ 55	$ 110	$ 81
General and administrative expense	18	108	298	270
	$ 24	$ 163	$ 408	$ 351

The fair value of each stock option award is estimated on the date of grant using the Black-Scholes option-pricing model that uses the assumptions noted in the table below. Expected volatility for the Company's common stock was determined based on an average of the historical volatility of a peer group of similar companies. The Company has limited stock option exercise information. Accordingly, the expected term of stock options granted was calculated using the simplified method, which represents the average of the contractual term of the stock option and the weighted-average vesting period of the stock option. The assumed dividend yield is based upon the Company's expectation of not paying dividends in the foreseeable future. The risk-free rate for periods within the expected life of the stock option is based upon the U.S. Treasury yield curve in effect at the time of grant.

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

The assumptions used in the Black-Scholes option-pricing model for stock option grants during the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2015 (unaudited) are as follows:

	Year Ended December 31,			Six Months Ended June 30, 2015 (unaudited)
	2012	2013	2014	
Expected life (in years)	4.3 - 6.1	5.6 - 6.1	5.8 - 6.1	5.6 - 6.7
Risk-free interest rate	0.5% - 1.0%	0.9% - 2.0%	1.8% - 2.8%	1.6% - 2.0%
Expected volatility	80.3% - 85.5%	74.7% - 76.2%	75.3% - 85.4%	79.3% - 84.7%
Expected dividend yield	—	—	—	—
Weighted-average grant date fair value per share	$0.35	$0.13	$0.36	$0.30

No related tax benefits were recognized for the years ended December 31, 2012, 2013 or 2014 and the six months ended June 30, 2015 (unaudited).

Income Taxes

Income taxes are recorded in accordance with ASC 740, *Accounting for Income Taxes* ("ASC 740"), which provides for deferred taxes using an asset and liability approach. The Company recognizes deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements or tax returns. The Company determines its deferred tax assets and liabilities based on differences between financial reporting and tax bases of assets and liabilities, which are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. Valuation allowances are provided if, based upon the weight of available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized.

The Company accounts for uncertain tax positions in accordance with the provisions of ASC 740. When uncertain tax positions exist, the Company recognizes the tax benefit of tax positions to the extent that the benefit will more likely than not be realized. The determination as to whether the tax benefit will more likely than not be realized is based upon the technical merits of the tax position as well as consideration of the available facts and circumstances. As of December 31, 2012, 2013 and 2014 and June 30, 2015 (unaudited), the Company does not have any significant uncertain tax positions.

Comprehensive loss

Comprehensive loss is defined as the change in equity of a business enterprise during a period from transactions, and other events and circumstances from non-owner sources. The Company had no items of other comprehensive loss for the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2015 (unaudited).

Cash and cash equivalents

The Company considers highly liquid investments with a maturity of three months or less when purchased to be cash equivalents. Cash equivalents, which consist primarily of money market funds, are stated at fair value.

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

Concentrations of credit risk

Financial instruments that potentially subject the Company to credit risk consist primarily of cash and cash equivalents. The Company holds these investments in highly-rated financial institutions, and limits the amounts of credit exposure to any one financial institution. These amounts at times may exceed federally insured limits. The Company has not experienced any credit losses in such accounts and does not believe it is exposed to any significant credit risk on these funds. The Company has no off-balance sheet concentrations of credit risk, such as foreign currency exchange contracts, option contracts or other hedging arrangements.

Fair value measurements

The Company records money market funds at fair value. ASC Topic 820, *Fair Value Measurements and Disclosures*, establishes a fair value hierarchy for those instruments measured at fair value that distinguishes between assumptions based on market data (observable inputs) and the Company's own assumptions (unobservable inputs). The hierarchy consists of three levels:

- Level 1—Unadjusted quoted prices in active markets for identical assets or liabilities.
- Level 2—Quoted prices for similar assets and liabilities in active markets, quoted prices in markets that are not active, or inputs which are observable, either directly or indirectly, for substantially the full term of the asset or liability.
- Level 3—Unobservable inputs that reflect the Company's own assumptions about the assumptions market participants would use in pricing the asset or liability in which there is little, if any, market activity for the asset or liability at the measurement date.

The following table summarizes the money market funds measured at fair value on a recurring basis as of June 30, 2015 (unaudited; in thousands):

	Level 1	Level 2	Level 3	Total
Money market funds	$ 41,579	$ —	$ —	$ 41,579
Total	$ 41,579	$ —	$ —	$ 41,579

The following table summarizes the money market funds measured at fair value on a recurring basis as of December 31, 2014 (in thousands):

	Level 1	Level 2	Level 3	Total
Money market funds	$ 9,319	$ —	$ —	$ 9,139
Total	$ 9,319	$ —	$ —	$ 9,139

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

The following table summarizes the money market funds measured at fair value on a recurring basis as of December 31, 2013 (in thousands):

	Level 1	Level 2	Level 3	Total
Money market funds	$ 23,182	$ —	$ —	$ 23,182
Total	$ 23,182	$ —	$ —	$ 23,182

The carrying amounts reflected in the balance sheets for cash, prepaid expenses and other current assets, accounts payable, and accrued expenses approximate their fair values at December 31, 2013 and 2014, due to their short-term nature.

There have been no changes to the valuation methods during the years ended December 31, 2013 and 2014, and the six months ended June 30, 2015 (unaudited). The Company evaluates transfers between levels at the end of each reporting period. There were no transfers of assets or liabilities between Level 1, Level 2 or Level 3 during the years ended December 31, 2012, 2013 or 2014, and the six months ended June 30, 2015 (unaudited).

Property and equipment

Property and equipment consist of laboratory equipment, computer equipment and software, leasehold improvements, furniture and fixtures and office equipment. Property and equipment are stated at cost and depreciated using the straight-line method over the estimated useful lives of the respective assets:

• Laboratory equipment	5-7 years
• Computer equipment and software	3 years
• Leasehold improvements	shorter of asset's useful life or remaining term of lease
• Furniture and fixtures	5 years
• Office equipment	5 years

Costs of major additions and betterments are capitalized; maintenance and repairs, which do not improve or extend the life of the respective assets, are charged to expense as incurred. Upon retirement or sale, the cost of the disposed asset and the related accumulated depreciation are removed from the accounts and the resulting gain or loss is recognized.

Impairment of long-lived assets

The Company periodically evaluates its long-lived assets for potential impairment in accordance with ASC Topic 360, *Property, Plant and Equipment*. Potential impairment is assessed when there is evidence that events or changes in circumstances indicate that the carrying amount of an asset may not be recovered. Recoverability of these assets is assessed based on undiscounted expected future cash flows from the assets, considering a number of factors, including past operating results, budgets and economic projections, market trends and product development cycles. If impairments are identified,

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

assets are written down to their estimated fair value. The Company has not recognized any impairment charges through December 31, 2014.

Deferred offering costs

Deferred offering costs, which consist of direct incremental legal and professional accounting fees relating to preferred stock and initial public offerings, are capitalized. The deferred offering costs are offset against the proceeds from the offering upon the consummation of the offering. In 2014, the Company's initial public offering was delayed and the deferred offering costs for that offering in the amount of $1,920,000 were expensed.

Segment and geographic information

Operating segments are identified as components of an enterprise about which separate discrete financial information is available for evaluation by the chief operating decision maker, or decision making group, in making decisions on how to allocate resources and assess performance. The Company's chief operating decision maker is the chief executive officer. The Company and the chief operating decision maker view the Company's operations and manage its business as one operating segment. The Company operates in only one geographic segment.

Subsequent events

The Company considered events or transactions occurring after the balance sheet date but prior to the date the consolidated financial statements are available to be issued for potential recognition or disclosure in its consolidated financial statements. Subsequent events have been evaluated through the date the financial statements were available to be issued. (See Note 17)

Convertible preferred stock

The Company initially records convertible preferred stock that may be redeemed at the option of the holder or based upon the occurrence of events not under the Company's control outside of stockholders' deficit at the value of the proceeds received, net of issuance costs. Subsequently, the Company adjusts the carrying value to the redemption value at each reporting period. In the absence of retained earnings, these accretion charges are recorded against additional paid-in capital, if any, and then to accumulated deficit.

Net loss per share attributable to common stockholders

The Company uses the two-class method to compute net loss per common share attributable to common stockholders because the Company has issued securities, other than common stock, that contractually entitle the holders to participate in dividends and earnings of the Company. The two-class method requires earnings for the period to be allocated between common stock and participating securities based upon their respective rights to receive distributed and undistributed earnings. Holders of the Company's Series A, Series B, Series B-1, Series C and Series D convertible preferred stock are entitled, on a *pari passu* basis, to receive dividends when, as and if declared by the board of directors, prior and in preference to any declaration or payment of any dividend on the common stock until such time as the total dividends paid on each share of Series C and Series D convertible preferred stock is equal to its cumulative dividends. The Series A, Series B and Series B-1 convertible preferred stock would also be entitled to the dividend amount paid to common stockholders on an as-if-converted-to-common stock basis. As a result, all series of the Company's convertible preferred stock are considered participating securities.

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

2. Summary of Significant Accounting Policies (Continued)

Under the two-class method, for periods with net income, basic net income per common share is computed by dividing the net income attributable to common stockholders by the weighted-average number of shares of common stock outstanding during the period. Net income attributable to common stockholders is computed by subtracting from net income the portion of current year earnings that the participating securities would have been entitled to receive pursuant to their dividend rights had all of the year's earnings been distributed. No such adjustment to earnings is made during periods with a net loss, as the holders of the participating securities have no obligation to fund losses. Diluted net loss per common share is computed by using the weighted-average number of shares of common stock outstanding. Due to net losses for the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2014 and 2015 (unaudited), basic and diluted net loss per share attributable to common stockholders were the same, as the effect of all potentially dilutive securities would have been anti-dilutive.

Reverse stock split

In October 2012, the stockholders approved a reverse stock split of the outstanding shares of the Company's common stock, Series A convertible preferred stock, and Series B convertible preferred stock in which every 10 shares were converted into one share of the related stock. No fractional shares were issued as a result of the reverse stock split. The par value for each class of stock remained at $0.001 per share. The effect of the reverse stock split has been recognized retroactively to inception, in all share and price per share data presented in the financial statements and the notes to the financial statements.

3. Cancer Prevention and Research Institute of Texas Grant and Other Grants

In August 2010, the Company received a $10.3 million commercialization award from the State of Texas through the Cancer Prevention and Research Institute of Texas ("CPRIT"). CPRIT was established to expedite innovation and commercialization in the area of cancer research and to enhance access to evidence-based prevention programs and services throughout the state. The commercialization award is a reimbursement grant. For the years ended December 31, 2012 and 2013, the Company recognized approximately $3,767,000 and $3,672,000, respectively, of grant proceeds from CPRIT as a reduction of research and development expense. There were no grant proceeds from CPRIT for the year ended December 31, 2014. The award was a three-year award that was funded annually, and the contract terminated on January 31, 2014. Additionally, the Company is obligated to make certain payments to CPRIT that survive termination. The Company accounted for advances received from the award as deferred grant reimbursement revenue and recorded a reduction of research and development expenses as qualifying research and development expenditures were incurred. Under the terms of the award, the Company is required to pay to CPRIT a portion of its revenues from sales of certain products by the Company, or received from the Company's licensees or sublicensees, at a percentage in the low single digits until the aggregate amount of such payments equals a specified multiple of the grant amount, and thereafter at a rate of less than one percent, subject to the Company's right, under certain circumstances, to make a one-time payment in a specified amount to CPRIT to buy out such payment obligations. At such time when the Company records revenues that are subject to royalties owed to CPRIT, the Company will record such royalties as cost of revenues in the period in which the related revenue is recorded. If the Company exercises its right to make a one-time payment to CPRIT

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

3. Cancer Prevention and Research Institute of Texas Grant and Other Grants (Continued)

to buy out the royalty payment obligations, the Company will record the entire one-time payment as cost of revenues in the period in which it exercises such right.

Total government grants recognized as a reduction of research and development expenses during the years ended December 31, 2012, 2013 and 2014 were $3,931,000, $3,850,000 and $81,000, respectively. Total government grants recognized as a reduction of research and development expenses during the six months ended June 30, 2014 and 2015 were $37,000 (unaudited) and $188,000 (unaudited), respectively.

4. Texas Emerging Technology Fund Award

In November 2009, the Texas Emerging Technology Fund ("TETF"), an economic development affiliate of the State of Texas, agreed to invest $5.0 million in the Company, with $2.5 million invested in 2009 and an additional $2.5 million invested in 2010. In exchange for the investment, the Company issued to the TETF a $5.0 million note payable with interest accrued at 8% per annum and a warrant to acquire the Company's capital stock (the "TETF Warrant"), with the number of shares and type of capital stock to be determined based on the Company's subsequent financing activity. The TETF Warrant was exercisable for $0.001 per share, the par value of the Company's capital stock.

The note payable and the related interest expense was to become payable only if an event of default occurred prior to November 11, 2019. If no events of default occurred prior to such time then the note payable and all related accrued interest were to be extinguished. The events of default included requirements for the Company to remain in business, continue microRNA development activities and remain in the State of Texas.

The number of shares of capital stock for which the TETF Warrant was to be exercised was based on the terms of the first financing transaction that met certain criteria (a "Qualifying Financing Transaction"). In August 2011, the Company completed a $1.5 million Series B convertible preferred stock financing, which qualified as a Qualifying Financing Transaction. The TETF exercised its rights under the TETF Warrant and acquired 2,243,330 shares of Series B convertible preferred stock.

At the time of issuance, the Company allocated all of the $5.0 million of proceeds received to the fair value of the warrant, which resulted in a 100% debt discount recorded on the note payable. The Company accreted the debt discount using the interest method over the 10-year life of the note.

In October 2012, in conjunction with an offering of Series C convertible preferred stock, the TETF amended its agreement with the Company in which the TETF agreed to exchange the 2,243,330 shares of Series B convertible preferred stock it held for 10,914,647 shares of the Company's Series B-1 convertible preferred stock. Also, as part of the amendment, the Company's note with the TETF was deemed satisfied in full and canceled, and the Company was released from of all repayment obligations. The Company recorded a gain on extinguishment of the TETF note payable and related accrued interest in the amount of $1.0 million.

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

5. Property and Equipment

Property and equipment consisted of the following (in thousands):

	December 31		June 30,
	2013	2014	2015 (unaudited)
Machinery, computers and equipment	$ 271	$ 373	$ 431
Leasehold improvements	18	18	18
Accumulated depreciation	(240)	(275)	(300)
	$ 49	$ 116	$ 149

Depreciation expense was $37,000, $36,000 and $35,000 in 2012, 2013 and 2014, respectively. Depreciation expense was approximately $17,000 (unaudited) and $25,000 (unaudited) for the six months ended June 30, 2014 and 2015, respectively.

6. Accrued expenses

Accrued expenses consist of the following (in thousands):

	December 31,		June 30,
	2013	2014	2015 (unaudited)
Accrued compensation and related items	$ 208	$ 243	$ 508
Accrued professional fees	65	210	303
Accrued clinical trial costs	152	551	798
Accrued drug product costs	—	525	—
Accrued other	38	99	21
	$ 463	$ 1,628	$ 1,630

7. Convertible Preferred Stock

During 2009, in connection with the spin-out of the Company from Asuragen, the Company issued 3,192,083 shares of Series A convertible preferred stock ("Series A") in exchange for $1,073,000 of intellectual property assets and in exchange for satisfaction of a note payable and accrued but unpaid interest of $5,311,000.

In August 2011, the Company issued 540,341 shares of Series B convertible preferred stock ("Series B") for gross proceeds of $1,500,000.

In 2011, the Company issued 2,243,330 shares of Series B convertible preferred stock upon the exercise of the TETF Warrant.

In October 2012, as described in Note 4, the Company exchanged 2,243,330 shares of Series B convertible preferred stock for 10,914,647 shares of Series B-1 convertible preferred stock ("Series B-1").

In October 2012, at the initial funding of an offering of the Company's Series C convertible preferred stock ("Series C"), the Company issued 35,463,724 shares with net proceeds totaling

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

7. Convertible Preferred Stock (Continued)

$16.8 million and an option to purchase 33,889,971 additional shares of Series C at $0.509 per share, or $17.3 million. In December 2013, the option was exercised, the second funding occurred and the Company issued 33,889,971 shares of Series C with net proceeds of $16.4 million. The option to purchase Series C was recorded as a liability with an initial fair value of $3.3 million. The fair value of the option of $3.0 million at the date of exercise was reclassed to additional paid-in capital.

With closing dates in March 2015 and April 2015, the Company issued 68,395,299 (unaudited) shares of the Company's Series D convertible preferred stock ("Series D") with gross proceeds of $41.8 million (unaudited). (See Note 17)

The convertible preferred stock has the following characteristics:

Conversion

The Series A, Series B, Series B-1, Series C and Series D are convertible into common stock at any time at the option of the holders. The conversion price is initially set at the original issue price per share of the convertible preferred stock and is adjusted to prevent dilution for stock splits, combinations and dividends.

The Company's convertible preferred stock shall automatically convert into shares of common stock at the then-applicable conversion price for each such series, immediately upon the closing of a firm underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, covering the offer and sale of common stock at a per share price of at least $1.527 and in which the gross proceeds of the Company are at least $40,000,000, before underwriting discounts, commissions and fees. At June 30, 2015, the minimum share price in an initial public offering to cause an automatic conversion was increased to $1.833 per share (unaudited). The Company's convertible preferred stock shall also automatically convert upon an affirmative vote of at least a majority of the convertible preferred stockholders voting together as a single class on an as-if converted basis.

Voting

Holders of the Company's convertible preferred stock are entitled to voting rights equal to holders of common stock. Holders of the Company's convertible preferred stock are also entitled to vote on certain matters with all shares of convertible preferred stock voting as a single class. Holders of the Company's Series D convertible preferred stock are also entitled to vote on certain matters with all Series D shares voting as a single class.

Dividends

Subject to certain circumstances, holders of shares of Series C are entitled to receive cumulative dividends at a rate per annum of 8%, payable in cash or in kind at the option of the holder of the stock, prior and in preference to any payment of dividends on shares of Series A, Series B, Series B-1 and common stock. Such dividends are payable in cash or in-kind in the event of a liquidation, redemption or conversion. In the event of a conversion of the Series C shares in connection with an initial public offering the cumulative dividends are only payable in-kind. Prior to the Series D issuance the number of Series C preferred shares payable in-kind for Series C dividends were calculated using

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

7. Convertible Preferred Stock (Continued)

the Series C issue price, subsequent to the Series D issuance the Series C preferred shares payable in-kind are calculated using the Series D issue price.

Subject to certain circumstances, holders of shares of Series D are entitled to receive cumulative dividends at a rate per annum of 8%, payable in cash or in kind at the option of the holder of the stock, prior and in preference to any payment of dividends on shares of any other class or series of stock. Such dividends are payable in cash or in-kind in the event of a liquidation, redemption or conversion. In the event of a conversion of the Series D shares in connection with an initial public offering, the cumulative dividends are only payable in-kind.

Series C and D cumulative dividends paid in-kind in common shares in connection with an initial public offering will use the fair value of the common shares as reflected on the cover of the final prospectus.

Holders of the Series A, Series B and Series B-1 are entitled to receive noncumulative dividends when and as declared by the board of directors of the Company. In the event dividends are declared, dividends related to Series B-1 must be satisfied prior to payment of any dividends on the Series A and Series B, which must be satisfied prior to payment of any dividends on the common stock.

Liquidation

In the event of any liquidation, dissolution or winding up of the affairs of the Company, merger or sale resulting in a change of control, or sale or license of all assets, the holders of the then-outstanding shares shall receive an amount per share equal to the sum of $0.611, $0.509, $0.687, $2.106 and $1.33 per share of Series D, Series C, Series B-1, Series B and Series A, respectively, plus all accrued and/or declared but unpaid dividends, payable in preference and priority to any payments made to the holders of the then-outstanding preferred or common stock. In the event that the Series B-1 has been deemed converted to common stock prior to the liquidation amounts being paid to Series A or Series B holders, the amount per share to be received by the holders of the Series B and Series A would be adjusted to $2.776 and $2.00 per share, respectively. If upon the occurrence of such an event that the assets and funds of the Company are insufficient to pay the holders of the convertible preferred stock, then the entire assets and funds of the Company legally available for distribution shall be distributed ratably to the holders of the convertible preferred stock in order of preference. Series D and Series C has preference and priority to any liquidation payments to Series B-1 holders, Series C has preference and priority to any liquidation payments made to Series B-1 holders, which, in turn, has preference and priority to any liquidation payments to Series A and Series B shareholders, which are treated as equal in preference.

After the distributions have been made to the holders of the Series D, Series C, Series B-1, Series B and Series A, the remaining available assets of the Company will be distributed ratably to the holders of shares of common stock, and holders of shares of Series B, Series C and Series D on the number of as-converted shares of common stock held.

Redemption

At any time after March 27, 2019, with a written request from at least sixty percent of the holders of the then-outstanding Series D, the Company will redeem the requested shares of the Series D at an

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

7. Convertible Preferred Stock (Continued)

amount equal to the original issue price, plus any accrued and/or declared but unpaid dividends, where the original purchase price is $0.611. The redemption amount is payable in three annual installments.

At any time after October 22, 2017, with a written request from the majority holders of the then-outstanding Series C, the Company will redeem the requested shares of the Series C at an amount equal to the original issue price, plus any accrued and/or declared but unpaid dividends, where the original purchase price is $0.509. The redemption amount is payable in three annual installments.

In the event of a default, as defined, prior to the earliest to occur of November 11, 2019, the TETF no longer owning the Series B-1 convertible preferred stock or a deemed liquidation event, the Company shall redeem all shares of Series B-1 convertible preferred stock owned by the TETF at the greater of $2.06 per share or three times fair market value, as defined.

The Series A and Series B are not entitled to any redemption rights. However, because a majority of the Company's outstanding stock is in the control of the convertible preferred stockholders who also control the Company's board of directors, a hostile takeover or other sale could occur outside the Company's control and thereby trigger a "deemed liquidation" and payment of liquidation preferences. Accordingly, the Company has classified convertible preferred stock outside of stockholders' deficit for all periods presented.

The Company adjusts the carrying value of the convertible preferred stock to the liquidation preferences of such shares at each reporting period end. The change in carrying value of the convertible preferred stock is recorded as a charge to additional paid-capital, if any, and then to accumulated deficit.

The Company has evaluated each of its series of convertible preferred stock and determined that each series should be considered an "equity host" and not a "debt host" as defined by ASC 815, *Derivatives and Hedging*. This evaluation is necessary in order to determine if any embedded features require bifurcation and, therefore, separate accounting as a derivative liability. The Company's analysis followed the "whole instrument approach," which compares an individual feature against the entire convertible preferred stock instrument which includes that feature. The Company's analysis was based on a consideration of the convertible preferred stock's economic characteristics and risks and more specifically evaluated all the stated and implied substantive terms and features including (i) whether the convertible preferred stock included redemption features, (ii) how and when any redemption features could be exercised, (iii) whether the holders of convertible preferred stock were entitled to dividends, (iv) the voting rights of the convertible preferred stock and (v) the existence and nature of any conversion rights. As a result of the Company's conclusion that the convertible preferred stock represents an equity host, the conversion feature of all series of convertible preferred stock is considered to be clearly and closely related to the associated convertible preferred stock host instrument. Accordingly, the conversion feature of all series of convertible preferred stock is not considered an embedded derivative that requires bifurcation.

The Company accounts for potentially beneficial conversion features under ASC 740-20, *Debt with Conversion and Other Options*. At the time of each of the issuances of convertible preferred stock, the Company's common stock into which each series of the Company's preferred stock is convertible had an estimated fair value less than the effective conversion prices of the convertible preferred stock. Therefore, there was no intrinsic value on the respective commitment dates.

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

8. Common Stock

The voting, dividend and liquidation rights of holders of shares of common stock are subject to and qualified by the rights, powers and preferences of the holders of shares of convertible preferred stock. The Company's common stock has the following characteristics:

Voting

The holders of shares of common stock are entitled to one vote for each share of common stock held at all meetings of stockholders and written actions in lieu of meetings.

Dividends

The holders of shares of common stock are entitled to receive dividends, if and when declared by the Company's board of directors. Cash dividends may not be declared or paid to holders of common stock until paid on each series of outstanding convertible preferred stock in accordance with their respective terms. As of December 31, 2014 and June 30, 2015 (unaudited), no cash dividends have been declared or paid since the Company's inception.

Reserved for future issuance

The Company has reserved for future issuance the following number of shares of common stock as of December 31, 2013 and 2014 and June 30, 2015 (unaudited):

	December 31		June 30,
	2013	2014	2015
			(unaudited)
Conversion of Series A convertible preferred stock	3,192,083	3,192,083	3,192,083
Conversion of Series B convertible preferred stock	540,341	540,341	540,341
Conversion of Series B-1 convertible preferred stock	10,914,647	10,914,647	10,914,647
Conversion of Series C convertible preferred stock	69,353,695	69,353,695	69,353,695
Conversion of Series D convertible preferred stock	—	—	68,395,299
Options to purchase common stock	8,310,741	8,825,459	14,545,150
	92,311,507	92,826,225	166,941,215

9. Stock Option Plans

During 2008, the Company adopted the 2008 Long Term Incentive Plan, which allows for incentive stock options for its employees and nonqualified stock options (inclusive of restricted stock units and stock appreciation rights) (collectively, the "2008 Plan") for employees and nonemployees under which an aggregate of 4,958,740 stock options and stock purchase rights may be granted. In December 2013, the total amount available for grant under the 2008 Plan was increased by 3,363,000 to 8,321,740. In March 2014, the Company's board of directors approved an increase of 1,727,288 shares available for

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

9. Stock Option Plans (Continued)

grant pursuant to the 2008 Plan to 10,049,028. In March 2015, the total amount of available to grant under the 2008 Plan was increased in conjunction with the Company's offering of Series D preferred stock by 5,874,757 shares to 15,923,785 (unaudited). Options under the 2008 Plan have a maximum life of 10 years. Options vest at various intervals, as determined by the Company's board of directors at the date of grant.

The Company's stock option activity for the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2015 was as follows:

	Number of Shares (in thousands)	Weighted-Average Exercise Price	Weighted-Average Contractual Life (years)
Outstanding at January 1, 2012	477,593	$ 0.50	6.73
Granted	14,579	0.50	
Exercised	(2,276)	0.50	
Forfeited/canceled	(13,460)	0.50	
Outstanding at December 31, 2012	476,436	0.50	5.84
Granted	4,940,007	0.13	
Exercised	(3,417)	0.16	
Forfeited/canceled	(89,708)	0.23	
Outstanding at December 31, 2013	5,323,318	0.16	8.80
Granted	3,516,862	0.54	
Exercised	(1,212,570)	0.16	
Forfeited/canceled	(113,143)	0.31	
Outstanding at December 31, 2014	7,514,467	0.33	8.52
Granted (unaudited)	4,921,750	0.43	
Exercised (unaudited)	(155,066)	0.23	
Forfeited/canceled (unaudited)	(242)	0.50	
Outstanding at June 30, 2015 (unaudited)	12,280,909	$ 0.37	8.77
Options exercisable at December 31, 2014	2,435,154	$ 0.19	7.75
Options exercisable at June 30, 2015 (unaudited)	4,097,263	$ 0.28	7.85

Options with an intrinsic value of $18,000, $440,000, $383,000 and $362,000 (unaudited) became vested during the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2015, respectively. The total intrinsic value of options exercised was zero during each of the years ended December 31, 2012, and 2013, $383,000 for the year ended December 31, 2014 and approximately $31,000 (unaudited) for the six months ended June 30, 2015. The intrinsic value of options exercisable and total options outstanding at December 31, 2014 was $584,000 and $1.1 million, respectively, and approximately $1.3 million (unaudited) and $2.7 million (unaudited), respectively, at June 30, 2015. The total fair value of options vested during the years ended December 31, 2012, 2013 and 2014 was $18,000, $132,000 and $198,000, respectively. The total fair value of options vested during the six months ended June 30, 2015 was approximately $489,000 (unaudited).

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

9. Stock Option Plans (Continued)

As of December 31, 2014, there was approximately $1,140,000 of unrecognized compensation cost related to the stock options granted under the 2008 Plan, which is expected to be amortized over the next 3.7 years. At June 30, 2015, there was $2.2 million (unaudited) of unrecognized compensation cost related to stock options. There were no restricted stock units or stock appreciation rights granted under the 2008 Plan in 2012, 2013 or 2014, or the six months ended June 30, 2015 (unaudited).

10. Income Taxes

The Company recorded no provision for income taxes for the years ended December 31, 2012, 2013 and 2014 and the six months ended June 30, 2015 (unaudited) due to reported net losses in each year.

A reconciliation of the expected income tax benefit (expense) computed using the federal statutory income tax rate to the Company's effective income tax rate is as follows for the years ended December 31, 2012, 2013 and 2014 (in thousands):

	2012	2013	2014
Income tax benefit computed at federal statutory tax rate	$ (1,241)	$ (2,188)	$ (5,383)
Change in valuation allowance	1,455	2,264	5,675
General business credits	—	(32)	(386)
TETF interest expense	104	—	—
Gain on extinguishment of note payable	(340)	—	—
Change in fair value of option liability	—	(115)	—
Other	22	71	94
Total	$ —	$ —	$ —

During the years ended December 31, 2012, 2013 and 2014, the Company had no interest and penalties related to income taxes.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amount of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. The Company has established a valuation allowance due to uncertainties regarding the realization of deferred tax assets based upon the Company's lack of earnings history. During the year ended December 31, 2014, the valuation allowance increased by $5.7 million. Significant components of

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

10. Income Taxes (Continued)

the Company's deferred tax assets and liabilities as of December 31, 2013 and 2014 are as follows (in thousands):

	2013	2014
Net operating loss carryforwards	$ 7,128	$ 12,414
Depreciation and amortization	533	507
Stock-based compensation	17	71
Credit carryforwards	78	444
Prepaid expenses	(49)	(49)
Accrued liabilities	35	30
Total deferred tax assets	7,742	13,417
Valuation allowance	(7,742)	(13,417)
Net deferred tax asset	$ —	$ —

As of December 31, 2013 and 2014, the Company had net operating loss ("NOL") carryforwards for federal income tax purposes of approximately $21.0 million and $36.5 million, respectively. The Company also had available research and development tax credits for federal income tax purposes of approximately $78,000 and $405,000, respectively. If not utilized, these carryforwards expire at various dates beginning in 2028. As of December 31, 2014, the Company had state research and development tax credit carryforwards of approximately $58,000, which will expire in 2024 if not utilized.

Utilization of the NOL carryforwards and tax credit carryforwards may be subject to a substantial annual limitation due to ownership change limitations that have occurred previously or that could occur in the future, as provided by Section 382 of the Internal Revenue Code of 1986 ("Section 382"), as well as similar state provisions. Ownership changes may limit the amount of NOL carryforwards and tax credit carryforwards that can be utilized annually to offset future taxable income and tax, respectively. In general, an ownership change, as defined by Section 382, results from transactions that increase the ownership of 5% shareholders in the stock of a corporation by more than 50 percentage points in the aggregate over a three-year period. The Company has not performed a study to determine whether any ownership change has occurred since the Company's formation through December 31, 2014. However, the Company believes that it has experienced at least one ownership change in the past and that it may experience additional ownership changes as a result of subsequent shifts in its stock ownership. Should there be an ownership change that has occurred or will occur, the Company's ability to utilize existing carryforwards could be substantially restricted.

The Company applies the accounting guidance in ASC 740 related to accounting for uncertainty in income taxes. The Company's reserves related to taxes are based on a determination of whether, and how much of, a tax benefit taken by the Company in its tax filings or positions is more likely than not to be realized following resolution of any potential contingencies present related to the tax benefit. As of December 31, 2013 and 2014, the Company had no unrecognized tax benefits.

The Company files income tax returns in the U.S. federal and Texas jurisdictions. The statute of limitations for assessment by the Internal Revenue Service ("IRS") is open for tax years ending December 31, 2014, 2013, 2012 and 2010, although carryforward attributes that were generated for tax years prior to 2011 may still be adjusted upon examination by the IRS if they either have been, or will

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

10. Income Taxes (Continued)

be, used in a future period. The 2010 and subsequent tax years remain open and subject to examination by the State of Texas. There are currently no federal or state income tax audits in progress.

11. Shared Services Agreement with Asuragen

On November 3, 2009, the Company entered into an agreement with Asuragen under which Asuragen shares space with and provides services to the Company in support of the Company's business. Such services has included human resources, finance and accounting, information technology, purchasing, shipping and receiving, equipment use, and various facility expenses. The Company pays Asuragen a monthly service fee for the services provided by Asuragen to the Company, which does not include direct charges incurred by Asuragen on behalf of the Company. The Company paid Asuragen approximately $813,000, $908,000 and $506,000 for the years ended December 31, 2012, 2013 and 2014, respectively, and approximately $195,000 (unaudited) for the six months ended June 30, 2015 for shared services.

On October 31, 2014, the Company entered into a sublease agreement with Asuragen for use of office, laboratory and shared space. In 2014, total rent expense was approximately $15,000 and was approximately $44,000 (unaudited) for the first six months of 2015. Both the lease and the shared service agreements expire on August 31, 2016, with the ability by either party to terminate with six months' notice.

12. Retirement Plan

The Company sponsors a defined contribution plan that provides all eligible employees an opportunity to accumulate funds for retirement. Employees who have completed 90 days of service and are at least 21 years of age may contribute to this plan, and these contributions are matched by the employer on a basis that is determined annually by the Company's board of directors. The Company may also make profit sharing contributions to the plan. Employer contributions for 2012, 2013 and 2014 were approximately $42,000, $64,000 and $91,000, respectively, and approximately $62,000 (unaudited) for the six months ended June 30, 2015

13. License agreements

Marina Biotech, Inc.

In December 2011, the Company entered into a licensing agreement with Marina, pursuant to which Marina granted to the Company a license to liposomal delivery technology, NOV340, known under the brand name "SMARTICLES," to develop and commercialize drug products incorporating Marina's delivery system exclusively in combination with the Company's lead therapeutic product, MRX34. In December 2013, the license agreement was amended to include three additional specific mimics selected by the Company to use with SMARTICLES on an exclusive basis, and in May 2015, the license agreement was further amended to reduce the amount of a specific milestone payment and to provide for the prepayment of such milestone payment.

The Company has paid Marina approximately $1.7 million December 31, 2014 in up-front and milestone payments and as consideration for the inclusion within the license of three additional microRNA compounds. As the Company progresses with respect to development and commercialization of its products, the Company will be required to make payments to Marina based

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

13. License agreements (Continued)

upon the achievement of certain development and regulatory milestones, totaling up to $6 million in the aggregate for each licensed product. The Company has agreed to pay up to an additional $4 million per licensed product upon the achievement of certain regulatory milestones for a specified number of additional indications, leading to a maximum cap on all milestone payments of $10 million per product. The exception to this is for the Company's lead therapeutic product, MRX34, where the aggregate of all remaining development and regulatory milestone payments due to Marina, including for all additional indications, is $4.1 million.

In addition to milestone payments, the Company will be required to pay low single digit royalties on net sales of licensed products other than MRX34, subject to customary reductions and offsets. As a result of the Company's 2013 amendment to the agreement with Marina, the Company is no longer required to pay a royalty to Marina with respect to sales of the Company's lead therapeutic product, MRX34. If the Company sublicenses its rights under the license from Marina, the Company is required to pay a portion of any revenue the Company receives from such sublicensees at a tiered percentage between the very low single digits and the mid-teens, depending on the circumstances in which the sublicense is entered into.

Yale University

In 2006, Asuragen entered into an exclusive license agreement with Yale University ("Yale") under certain patent rights relating to microRNAs arising from the laboratory of Dr. Frank Slack. This agreement was assigned to the Company by Asuragen in connection with the Company's acquisition of certain assets, including patent rights, in 2009. In February 2014, the Company as successor-in-interest to Asuragen, amended and restated the exclusive license agreement. Some of the patent filings in the Company's intellectual property portfolio that are licensed to the Company by Asuragen are also included in the patents licensed under the agreement with Yale. The Company will be required to pay royalties to Yale on net sales of licensed products that contain specified microRNAs, at a percentage ranging from the very low to the low single digits, subject to customary reductions and offsets. The Company will also be required to pay to Yale a portion of specified gross revenue that the Company receives from the Company's sublicensees at a percentage in the mid-single digits.

The Company will be required to make payments for achievement of certain development and regulatory milestones by products containing one specified microRNA and covered by the licensed patents, of up to $600,000 in the aggregate for each such product, subject to reduction in certain circumstances. In addition, the Company is required to pay an annual license maintenance fee and minimum annual royalties under certain circumstances.

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

14. Commitments and Contingencies

Shared Services Agreement

Pursuant to a shared services agreement and sublease with Asuragen (see Note 11), the Company has remaining commitments for payments as follows (in thousands):

	2015	2016	Total
Shared Services Agreement	$ 389	$ 287	$ 676
Sublease Agreement	89	59	148
Shared Services Agreement	$ 478	$ 346	$ 824

Legal Contingencies

The Company does not currently have any contingencies related to ongoing legal matters.

15. Net Loss Per Share Attributable to Common Stockholders

The following table summarizes the computation of basic and diluted net loss per share attributable to common stockholders of the Company (in thousands, except share and per share data):

	Year Ended December 31,			Six Months Ended June 30,	
	2012	2013	2014	2014	2015
				(unaudited)	
Net loss	$ (3,658)	$ (6,436)	$ (15,834)	$ (6,033)	$ (9,963)
Accretion of convertible preferred stock to redemption value	(5,865)	(831)	—	—	(448)
Accrued dividends on convertible preferred stock	(277)	(1,493)	(2,824)	(1,400)	(2,214)
Net loss attributable to common stockholders—basic and diluted	(9,800)	(8,760)	(18,658)	(7,433)	(12,625)
Weighted-average number of common shares—basic and diluted	26,237	29,804	961,963	670,035	1,351,526
Net loss per share attributable to common stockholders—basic and diluted	$ (373.52)	$ (293.92)	$ (19.40)	$ (11.09)	$ (9.34)

The following potentially dilutive securities outstanding, prior to the use of the treasury stock method or if-converted method, have been excluded from the computation of diluted weighted-average common shares outstanding, because including them would have had an anti-dilutive effect due to the losses reported.

	December 31,			June 30,	
	2012	2013	2014	2014	2015
				(unaudited)	
Convertible preferred stock	50,110,795	84,000,766	84,000,766	84,000,766	152,396,065
Stock options	476,436	5,323,318	7,514,467	7,691,552	12,280,909
	50,587,231	89,324,084	91,515,233	91,692,318	164,676,974

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

15. Net Loss Per Share Attributable to Common Stockholders (Continued)

The unaudited pro forma basic and diluted loss per share attributable to common stockholders for the year ended December 31, 2014 and the six months ended June 30, 2015 give effect to the automatic conversion of all shares of convertible preferred stock upon an initial public offering by treating all shares of convertible preferred stock as if they had been converted to common stock in all periods in which such shares were outstanding. Accordingly, the pro forma basic and diluted loss per share attributable to common stockholders do not include the effects of the accretion of convertible preferred stock to redemption value and accretion of dividends. Shares to be sold in the offering are excluded from the unaudited pro forma basic and diluted loss per share attributable to common stockholders computations.

As the Company incurred a net loss for the year ended December 31, 2014 and the six months ended June 30, 2015, there is no income allocation required under the two-class method or dilution attributed to pro forma weighted-average shares outstanding in the computation of pro forma diluted loss per share attributable to common stockholders.

Unaudited pro forma basic and diluted loss per share attributable to common stockholders are computed as follows (in thousands, except share and per share data):

	Year Ended December 31, 2014	Six Months Ended June 30, 2015
Numerator:		
Net loss attributable to common stockholders—basic and diluted	$ (18,658)	$ (12,625)
Add: accretion of convertible preferred stock to redemption value	—	448
Add: accrued dividends on convertible preferred stock	2,824	2,214
Net loss	(15,834)	(9,963)
Denominator:		
Weighted-average number of shares outstanding—basic and diluted	961,963	1,351,526
Add: adjustment to reflect assumed effect of conversion of convertible preferred stock	84,000,766	117,600,670
Pro forma weighted-average number of shares outstanding—basic and diluted	84,962,729	118,952,196
Pro forma net loss per share—basic and diluted	$ (0.19)	$ (0.08)

16. Bridge Notes

Winkler Convertible Promissory Note

In June 2011, the Company issued a convertible promissory note to Matthew Winkler, Ph.D., that allowed the Company to draw amounts from time to time up to the aggregate maximum principal sum of $1.0 million. In January 2012 and June 2012, the Company amended and restated the convertible promissory note with Dr. Winkler, raising the aggregate maximum principal sum to $1.5 million and extending the maturity date. During the period the promissory note, as amended, was outstanding, the Company borrowed an aggregate principal amount of $750,000. In October 2012, Dr. Winkler contributed the entire principal amount of the promissory note, as amended, to the Company in exchange for shares of Series C convertible preferred stock, which was distributed in a dividend to the

MIRNA THERAPEUTICS, INC.

Notes to Financial Statements (Continued)

16. Bridge Notes (Continued)

holders of Series A convertible preferred stock and Series B convertible preferred stock. Dr. Winkler is a member of the Company's board of directors and a holder of the Company's capital stock.

Asuragen Convertible Promissory Note

In June 2012, the Company issued a convertible promissory note to Asuragen that allowed the Company to draw amounts from time to time up to the aggregate maximum principal sum of $500,000. In October 2012, the Company repaid the full amount of all principal drawn on the promissory note, and accrued and unpaid interest thereon, of approximately $123,000 in cash. Dr. Winkler, who is a member of the Company's board of directors and a holder of the Company's capital stock, currently serves as the Chairman and Chief Scientific Officer, and is a founder and holder of capital stock, of Asuragen.

17. Subsequent Events

Offering of Series D Preferred Stock

On various dates between March 31, 2015 and April 20, 2015, the Company completed two closings of an offering of the Company's Series D convertible preferred stock ("Series D"). The Company issued 68,395,299 shares with gross proceeds totaling approximately $41.8 million.

The Series D has similar preference terms as the Series C, with the holders of the Company's Series D stock also being entitled to vote on certain matters as a single class. For all dividends accrued subsequent to March 31, 2015 by Series C and Series D preferred stock and paid in kind as common stock, the number of shares of common stock paid in kind will be calculated by dividing the dividends earned by the offering price per share of the Series D preferred stock.

Shares

Common Stock

Prospectus

Citigroup	**Leerink Partners**
Oppenheimer & Co.	**Cantor Fitzgerald & Co.**

, 2015

PART II

Information Not Required in Prospectus

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth the costs and expenses, other than the underwriting discounts and commissions, payable by the registrant in connection with the sale of Common Stock being registered. All amounts are estimates except for the Securities and Exchange Commission, or SEC, registration fee, the FINRA filing fee and The NASDAQ Global Market listing fee.

Item	Amount to be paid
SEC registration fee	$ *
FINRA filing fee	*
The NASDAQ Global Market listing fee	*
Printing and engraving expenses	*
Legal fees and expenses	*
Accounting fees and expenses	*
Blue Sky, qualification fees and expenses	*
Transfer Agent fees and expenses	*
Miscellaneous expenses	*
Total	$ *

* To be completed by amendment

Item 14. Indemnification of Directors and Officers.

As permitted by Section 102 of the Delaware General Corporation Law, we have adopted provisions in our amended and restated certificate of incorporation and bylaws that limit or eliminate the personal liability of our directors for a breach of their fiduciary duty of care as a director. The duty of care generally requires that, when acting on behalf of the corporation, directors exercise an informed business judgment based on all material information reasonably available to them. Consequently, a director will not be personally liable to us or our stockholders for monetary damages for breach of fiduciary duty as a director, except for liability for:

- any breach of the director's duty of loyalty to us or our stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- any act related to unlawful stock repurchases, redemptions or other distributions or payment of dividends; or
- any transaction from which the director derived an improper personal benefit.

These limitations of liability do not affect the availability of equitable remedies such as injunctive relief or rescission. Our amended and restated certificate of incorporation also authorizes us to indemnify our officers, directors and other agents to the fullest extent permitted under Delaware law.

As permitted by Section 145 of the Delaware General Corporation Law, our amended and restated bylaws provide that:

- we may indemnify our directors, officers, and employees to the fullest extent permitted by the Delaware General Corporation Law, subject to limited exceptions;

- we may advance expenses to our directors, officers and employees in connection with a legal proceeding to the fullest extent permitted by the Delaware General Corporation Law, subject to limited exceptions; and

- the rights provided in our amended and restated bylaws are not exclusive.

Our amended and restated certificate of incorporation, to be attached as Exhibit 3.3 hereto, and our amended and restated bylaws, to be attached as Exhibit 3.5 hereto, provide for the indemnification provisions described above and elsewhere herein. We intend to enter into separate indemnification agreements with our directors and officers which may be broader than the specific indemnification provisions contained in the Delaware General Corporation Law. These indemnification agreements generally require us, among other things, to indemnify our officers and directors against liabilities that may arise by reason of their status or service as directors or officers, other than liabilities arising from willful misconduct. These indemnification agreements also generally require us to advance any expenses incurred by the directors or officers as a result of any proceeding against them as to which they could be indemnified. In addition, we have purchased a policy of directors' and officers' liability insurance that insures our directors and officers against the cost of defense, settlement or payment of a judgment in some circumstances. These indemnification provisions and the indemnification agreements may be sufficiently broad to permit indemnification of our officers and directors for liabilities, including reimbursement of expenses incurred, arising under the Securities Act of 1933, as amended, or the Securities Act.

The form of Underwriting Agreement, to be attached as Exhibit 1.1 hereto, provides for indemnification by the underwriters of us and our officers who sign this Registration Statement and directors for specified liabilities, including matters arising under the Securities Act.

Item 15. Recent Sales of Unregistered Securities.

The following list sets forth information as to all securities we have sold since January 1, 2012, which were not registered under the Securities Act.

1. In October 2012, we issued 10,914,647 shares of Series B-1 convertible preferred stock for 2,243,330 shares of Series B Preferred Stock, which gives effect to the 10-for-1 reverse stock split in October 2012, and the extinguishment of a note payable.

2. In October 2012 and December 2013, we issued 33,889,971 and 33,889,971 shares of Series C convertible preferred stock, respectively, at a price per share of $0.509 per share for aggregate gross consideration of approximately $34.5 million to 18 accredited investors.

3. In October 2012, we issued 1,573,753 shares of Series C convertible preferred shares as a dividend to the holders of our Series A convertible preferred stock and Series B convertible preferred stock.

4. In April 2014, we granted 7,934 shares of common stock to three accredited investors in exchange for past services.

5. In March 2015, we issued an aggregate of 58,084,334 shares of our Series D convertible preferred stock at a price per share of $0.611 per share for aggregate gross consideration of $35.5 million to 17 accredited investors.

6. In April 2015, we issued an aggregate of 10,310,965 shares of our Series D convertible preferred stock at a price per share of $0.611 per share for aggregate gross consideration of $6.3 million to two accredited investors.

7. We granted stock options and stock awards to employees, directors and consultants under our 2008 Long Term Incentive Plan, as amended, covering an aggregate of 13,363,198 shares of

common stock, at a weighted-average average exercise price of $0.35 per share. Of these, options covering an aggregate of 186,556 shares were cancelled without being exercised.

8. We sold an aggregate of 1,373,329 shares of common stock to employees, directors and consultants for cash consideration in the aggregate amount of $246,263.86 upon the exercise of stock options and stock awards.

We claimed exemption from registration under the Securities Act for the sale and issuance of securities in the transactions described in paragraphs (1) through (6) above by virtue of Section 4(2) and/or Regulation D promulgated thereunder as transactions not involving any public offering. All of the purchasers of unregistered securities for which we relied on Section 4(2) and/or Regulation D represented that they were accredited investors as defined under the Securities Act. We claimed such exemption on the basis that (a) the purchasers in each case represented that they intended to acquire the securities for investment only and not with a view to the distribution thereof and that they either received adequate information about the registrant or had access, through employment or other relationships, to such information and (b) appropriate legends were affixed to the stock certificates issued in such transactions.

We claimed exemption from registration under the Securities Act for the sales and issuances of securities in the transactions described in paragraphs (7) and (8) above under Section 4(2) of the Securities Act, in that such sales and issuances did not involve a public offering, or under Rule 701 promulgated under the Securities Act, in that they were offered and sold either pursuant to written compensatory plans or pursuant to a written contract relating to compensation, as provided by Rule 701.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibits. See the Exhibit Index attached to this Registration Statement, which is incorporated by reference herein.

(b) Financial Statement Schedules. Schedules not listed above have been omitted because the information required to be set forth therein is not applicable or is shown in the financial statements or notes thereto.

Item 17. Undertakings.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the Registrant pursuant to the foregoing provisions, or otherwise, the Registrant has been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act, and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer, or controlling person of the Registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question of whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

The undersigned Registrant hereby undertakes that:

1. For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this Registration Statement in reliance upon Rule 430A and contained in a form of prospectus filed by the Registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this Registration Statement as of the time it was declared effective.

2. For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

The undersigned Registrant hereby undertakes to provide to the underwriters at the closing specified in the underwriting agreement certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

The undersigned Registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned Registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser:

1. Any preliminary prospectus or prospectus of the undersigned Registrant relating to the offering required to be filed pursuant to Rule 424;

2. Any free writing prospectus relating to the offering prepared by or on behalf of the undersigned Registrant or used or referred to by the undersigned Registrant;

3. The portion of any other free writing prospectus relating to the offering containing material information about the undersigned Registrant or its securities provided by or on behalf of the undersigned Registrant; and

4. Any other communication that is an offer in the offering made by the undersigned Registrant to the purchaser.

Signatures

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant has duly caused this Amendment to Registration Statement on Form S-1 to be signed on its behalf by the undersigned, thereunto duly authorized, in Austin, Texas, on August 24, 2015.

MIRNA THERAPEUTICS, INC.

By: /s/ PAUL LAMMERS

Paul Lammers, M.D., M.Sc.
President and Chief Executive Officer

Power of Attorney

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Paul Lammers and Jon Irvin, and each of them acting individually, as his or her true and lawful attorneys-in-fact and agents, each with full power of substitution, for him or her in any and all capacities, to sign any and all amendments to this Registration Statement, including post-effective amendments or any abbreviated registration statement and any amendments thereto filed pursuant to Rule 462(b) increasing the number of securities for which registration is sought, and to file the same, with all exhibits thereto and other documents in connection therewith, with the SEC, granting unto said attorneys-in-fact and agents, with full power of each to act alone, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully for all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or his, her or their substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act, this Amendment to Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
/s/ PAUL LAMMERS Paul Lammers, M.D., M.Sc.	Director, President and Chief Executive Officer (Principal Executive Officer)	August 24, 2015
/s/ JON IRVIN Jon Irvin	Chief Financial Officer (Principal Financial and Accounting Officer)	August 24, 2015
/s/ MICHAEL POWELL Michael Powell, Ph.D.	Chairman of the Board	August 24, 2015
/s/ LAWRENCE M. ALLEVA Lawrence M. Alleva	Director	August 24, 2015

Signature	Title	Date
/s/ ELAINE V. JONES Elaine V. Jones, Ph.D.	Director	August 24, 2015
/s/ ED MATHERS Ed Mathers	Director	August 24, 2015
/s/ CLAY SIEGALL Clay Siegall, Ph.D.	Director	August 24, 2015
/s/ MATTHEW WINKLER Matthew Winkler, Ph.D.	Director	August 24, 2015

Exhibit Index

Exhibit Number	Description
1.1*	Form of Underwriting Agreement.
3.1	Sixth Amended and Restated Certificate of Incorporation, currently in effect.
3.2*	Form of Seventh Amended and Restated Certificate of Incorporation, effecting a reverse stock split, to be in effect prior to the consummation of this offering.
3.3*	Form of Amended and Restated Certificate of Incorporation, to be in effect immediately prior to the consummation of this offering.
3.4	Bylaws, currently in effect.
3.5*	Form of Amended and Restated Bylaws, to be in effect immediately prior to the consummation of this offering.
4.1	Reference is made to Exhibits 3.1 through 3.5.
4.2*	Form of Common Stock Certificate.
4.3	Second Amended and Restated Investor Rights Agreement, dated as of October 22, 2012, among Mirna Therapeutics, Inc. and certain of its stockholders, as amended.
5.1*	Opinion of Latham & Watkins LLP.
10.1(A)	Services Agreement, dated January 1, 2013, by and between Mirna Therapeutics, Inc. and Asuragen, Inc.
10.1(B)	Amendment No. 1 to the Services Agreement, dated October 31, 2014, by and between Mirna Therapeutics, Inc. and Asuragen, Inc.
10.2(A)†	Cross License Agreement, dated November 3, 2009, by and between Mirna Therapeutics, Inc. and Asuragen, Inc.
10.2(B)†	First Amendment to the Cross License Agreement, dated September 28, 2012, by and between Mirna Therapeutics, Inc. and Asuragen, Inc.
10.3(A)†	License Agreement, dated December 22, 2011, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc.
10.3(B)†	Side Letter to License Agreement, dated December 22, 2011, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc.
10.3(C)†	Side Letter to License Agreement, dated November 16, 2012, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc.
10.3(D)†	Amendment No. 1 to License Agreement, dated December 27, 2013, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc.
10.3(E)†	Side Letter to License Agreement, dated January 9, 2014, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc.
10.3(F)*	Amendment No. 2 to License Agreement, dated May 11, 2015, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc.
10.4†	Amended and Restated Agreement, dated February 6, 2014, by and between Mirna Therapeutics, Inc. and Yale University.
10.5†	License Agreement, dated March 10, 2013, by and between Mirna Therapeutics, Inc. and University of Zurich.

Exhibit Number	Description
10.6†	Cancer Research Grant Contract, dated August 31, 2010, by and between Mirna Therapeutics, Inc. and the Cancer Prevention and Research Institute of Texas.
10.7†	Supply Agreement for a Liposomal Formulation, dated November 18, 2012, by and between Mirna Therapeutics, Inc. and Polymun Scientific Immunbiologische Forschung GmbH.
10.8(A)#	2008 Long Term Incentive Plan, as amended.
10.8(B)#	Form of Notice of Stock Option Grant under 2008 Long Term Incentive Plan.
10.8(C)#	Form of Stock Option Agreement under 2008 Long Term Incentive Plan.
10.9#*	2015 Equity Incentive Award Plan.
10.10#*	Form of Indemnity Agreement for directors and officers.
10.11	Sublease, dated October 31, 2014, by and between Mirna Therapeutics, Inc. and Asuragen, Inc.
23.1	Consent of independent registered public accounting firm.
23.2*	Consent of Latham & Watkins LLP (included in Exhibit 5.1).
24.1	Power of Attorney. Reference is made to the signature page to the Registration Statement.

* To be filed by amendment.

† Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a request for confidential treatment and this exhibit has been filed separately with the SEC.

# Indicates management contract or compensatory plan.

+ Previously filed.

SIXTH AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION
OF
MIRNA THERAPEUTICS, INC.
(a Delaware corporation)

(Pursuant to Sections 228, 242 and 245 of the
General Corporation Law of the State of Delaware)

Mirna Therapeutics, Inc. (the "***Company***"), a corporation organized and existing under the General Corporation Law of the State of Delaware as set forth in Title 8 of the Delaware Code (the "***DGCL***"), hereby certifies as follows:

1. The Company was originally incorporated on December 20, 2007 pursuant to the DGCL. A Second Amended and Restated Certificate of Incorporation of the Company was filed with the Secretary of State of Delaware on December 4, 2009. A Third Amended and Restated Certificate of Incorporation of the Company was filed with the Secretary of State of Delaware on August 10, 2011. A Fourth Amended and Restated Certificate of Incorporation of the Company was filed with the Secretary of State of Delaware on October 22, 2012. A Fifth Amended and Restated Certificate of Incorporation of the Company was filed with the Secretary of State of Delaware on March 21, 2014 (the "***Original Certificate***").

2. Pursuant to Sections 228, 242 and 245 of the DGCL, this Sixth Amended and Restated Certificate of Incorporation (this "***Restated Certificate***") restates and integrates and further amends the provisions of the Original Certificate.

3. The text of the Original Certificate is hereby amended and restated in its entirety to read as follows:

ARTICLE ONE

The name of this corporation is Mirna Therapeutics, Inc. (the "***Company***").

ARTICLE TWO

The address of the registered office of the Company in the State of Delaware is Corporation Trust Center, 1209 Orange Street, in the City of Wilmington, County of New Castle, Delaware 19801. The name of its registered agent at such address is The Corporation Trust Company.

ARTICLE THREE

The purpose of the Company is to engage in any lawful act or activity for which a corporation may be organized under the DGCL.

ARTICLE FOUR

A. The Company is authorized to issue two classes of stock to be designated, respectively, Common Stock and Preferred Stock. The total number of shares that the Company is authorized to issue is 332,750,538 shares, 175,100,000 shares of which shall be Common Stock (the "***Common Stock***"), and 157,650,538 shares of which shall be Preferred Stock (the "***Preferred Stock***"). The Common Stock shall have a par value of $0.001 per share and the Preferred Stock shall have a par value of $0.001 per share.

B. [Reserved.]

C. Subject to the provisions of this Restated Certificate, the Company may purchase, directly or indirectly, its own shares to the extent that may be allowed by law.

D. 3,192,083 of the authorized shares of Preferred Stock are hereby designated Series A Preferred Stock (the "***Series A Preferred Stock***"), 540,341 of the authorized shares of Preferred Stock are hereby designated Series B Preferred Stock (the "***Series B Preferred Stock***" and together with the Series A Preferred Stock, the "***Junior Preferred Stock***"), 10,914,647 of the authorized shares of Preferred Stock are hereby designated Series B-1 Preferred Stock (the "***Series B-1 Preferred Stock***"), 69,353,712 of the authorized shares of Preferred Stock are hereby designated Series C Preferred Stock (the "***Series C Preferred Stock***"), and 73,649,755 of the authorized shares of Preferred Stock are hereby designated Series D Preferred Stock (the "***Series D Preferred Stock***" and collectively with the Junior Preferred Stock, Series B-1 Preferred Stock and Series C Preferred Stock, the "***Series Preferred***").

E. The "***Effective Time***" means the time upon which this Restated Certificate becomes effective pursuant to the DGCL.

F. The "***Original Issue Price***" means, collectively, the Series A Original Issue Price, Series B Original Issue Price, Series B-1 Original Issue Price, Series C Original Issue Price and the Series D Original Issue Price.

G. The "***Series A Original Issue Price***" means $2.00 per share, as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to the Series A Preferred Stock after the Effective Time.

H. The "***Series B Original Issue Price***" means $2.776 per share, as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to the Series B Preferred Stock after the Effective Time.

I. The "***Series B-1 Original Issue Price***" means $0.458 per share, as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to the Series B-1 Preferred Stock after the Effective Time.

J. The "***Series C Original Issue Price***" means $0.509 per share, as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to the Series C Preferred Stock after the Effective Time.

K. The "***Series D Original Issue Price***" means $0.611 per share, as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to the Series D Preferred Stock after the Effective Time.

L. The rights, preferences, privileges, restrictions and other matters relating to the Series Preferred are as follows:

1. Dividend Rights.

(a) From and after the applicable date of the issuance of any share of Series D Preferred Stock, dividends at the rate per annum of eight percent (8%) of the Series D Original Issue Price shall accrue on such share of Series D Preferred Stock (the "***Series D Accruing Dividends***"), payable in cash or in kind, at the written election of the holders of at least a majority of the then outstanding Series D Preferred Stock (the "***Majority Series D Holders***"), on a pari passu basis among the holders of shares of Series D Preferred Stock and prior and in preference to any payment of dividend on shares of Series C Preferred Stock (including, without limitation, any Series C Accruing Dividends (as defined below)), Series B-1 Preferred Stock, Junior Preferred Stock and Common Stock, when, as and if declared by the Company's board of directors (the "***Board***"), but only out of funds that are legally available therefor, which such payment shall in no event be later than upon the earliest to occur of (i) any payment of Series C Accruing Dividends or any event obligating the Company to pay Series C Accruing Dividends, in which case the Series D Accruing Dividends shall be paid prior and in preference to the Series C Accruing Dividends; (ii) any Liquidation Event (as defined below), (iii) in connection with the conversion of shares of Series D Preferred Stock into shares of Common Stock in accordance with Section 5; provided that such payment shall only be made on the shares converting to Common Stock, and (iv) any redemption of the Series D Preferred Stock in accordance with Section 6 (each, a "***Series D Accruing Dividend Event***"); *provided, however*, that, notwithstanding anything herein to the contrary, payment of Series D Accruing Dividends in connection with the conversion of shares of Series D Preferred Stock into shares of Common Stock in accordance with Section 5 shall be governed by the operation of Section 5(d) below. The Series D Accruing Dividends shall accrue from day to day, whether or not declared, and shall be cumulative; *provided, however*, that except as set forth in this Section 1(a), Section 3, Section 5 and Section 6, the Series D Accruing Dividends shall be payable only when, as and if declared by the Board and the Company shall otherwise be under no obligation to pay the Series D Accruing Dividends; *provided, further*, that payment of Series D Accruing Dividends in connection with a Series D Accruing Dividend Event is subject to a Series D Accrual End Date as determined by the Board pursuant to Section 1(h) below. From and after the Effective Time, the Company shall not declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Company (other than (i) payment of the Series C Accruing Dividends in connection with a Series C Accruing Dividend Event (as defined below), in which case the Series D Accruing Dividends shall be paid prior and in preference to the Series C Accruing Dividends, or (ii) dividends on shares of Common Stock payable in shares of Common Stock) unless (in addition to the obtaining of any consents required elsewhere in this Restated Certificate) the holders of shares of Series D Preferred Stock shall first receive a dividend

on each outstanding share of Series D Preferred Stock in an amount at least equal to the sum of (i) the amount of the aggregate Series D Accruing Dividends then accrued on such share of Series D Preferred Stock and not previously paid plus (ii) (A) in the case of a dividend on Common Stock or any class or series that is convertible into Common Stock, that dividend per share of Series D Preferred Stock as would equal the product of (1) the dividend payable on each share of such class or series determined, if applicable, as if all shares of such class or series had been converted into Common Stock and (2) the number of shares of Common Stock issuable upon conversion of a share of Series D Preferred Stock, in each case calculated on the record date for determination of holders entitled to receive such dividend or (B) in the case of a dividend on any class or series that is not convertible into Common Stock, at a rate per share of Series D Preferred Stock determined by (1) dividing the amount of the dividend payable on each share of such class or series of capital stock by the original issuance price of such class or series of capital stock (as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to such class or series after the Effective Time) and (2) multiplying such fraction by an amount equal to the Series D Original Issue Price; *provided* that if the Company declares, pays or sets aside, on the same date, a dividend on shares of more than one class or series of capital stock of the Company, the dividend payable to the holders of Series D Preferred Stock pursuant to this Section 1(a) shall be calculated based upon the dividend on the class or series of capital stock that would result in the highest Series D Preferred Stock dividend. Subject to Section 5(d)(ii), if the Majority Series D Holders elect to have the Series D Accruing Dividends paid in kind, on the payment date the Company shall issue to each holder a number of additional shares of Series D Preferred Stock equal to the quotient obtained by dividing the Series D Accruing Dividends for such holder by the Series D Original Issue Price.

(b) From and after the applicable date of the issuance of any share of Series C Preferred Stock, dividends at the rate per annum of eight percent (8%) of the Series C Original Issue Price shall accrue on such share of Series C Preferred Stock (the "***Series C Accruing Dividends***"), payable in cash or in kind, at the written election of the Majority Series C Holders (as defined in Section 6 hereof), on a pari passu basis among the holders of shares of Series C Preferred Stock and prior and in preference to any payment of any dividend on shares of Series B-1 Preferred Stock, Junior Preferred Stock and Common Stock, when, as and if declared by the Board, but only out of funds that are legally available therefor, which such payment shall in no event be later than upon the earliest to occur of (i) any Liquidation Event, (ii) in connection with the conversion of shares of Series C Preferred Stock into shares of Common Stock in accordance with Section 5; provided that such payment shall only be made on the shares converting to Common Stock, and (iii) any redemption of the Series C Preferred Stock in accordance with Section 6 (each, a "***Series C Accruing Dividend Event***"); *provided, however*, that, notwithstanding anything herein to the contrary, payment of Series C Accruing Dividends in connection with the conversion of shares of Series C Preferred Stock into shares of Common Stock in accordance with Section 5 shall be governed by the operation of Section 5(d) below. The Series C Accruing Dividends shall accrue from day to day, whether or not declared, and shall be cumulative; *provided, however*, that except as set forth in this Section 1(b), Section 3, Section 5 and Section 6, the Series C Accruing Dividends shall be payable only when, as and if declared by the Board and the

Company shall otherwise be under no obligation to pay the Series C Accruing Dividends; *provided, further*, that payment of Series C Accruing Dividends in connection with a Series C Accruing Dividend Event is subject to a Series C Accrual End Date as determined by the Board pursuant to Section 1(i) below. From and after the Effective Time, the Company shall not declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Company (other than (i) dividends on shares of Common Stock payable in shares of Common Stock or (ii) dividends on shares of Series D Preferred Stock pursuant to Section 1(a) above) unless (in addition to the obtaining of any consents required elsewhere in this Restated

Certificate) the holders of shares of Series C Preferred Stock shall first receive a dividend on each outstanding share of Series C Preferred Stock in an amount at least equal to the sum of (i) the amount of the aggregate Series C Accruing Dividends then accrued on such share of Series C Preferred Stock and not previously paid plus (ii) (A) in the case of a dividend on Common Stock or any class or series that is convertible into Common Stock, that dividend per share of Series C Preferred Stock as would equal the product of (1) the dividend payable on each share of such class or series determined, if applicable, as if all shares of such class or series had been converted into Common Stock and (2) the number of shares of Common Stock issuable upon conversion of a share of Series C Preferred Stock, in each case calculated on the record date for determination of holders entitled to receive such dividend or (B) in the case of a dividend on any class or series that is not convertible into Common Stock, at a rate per share of Series C Preferred Stock determined by (1) dividing the amount of the dividend payable on each share of such class or series of capital stock by the original issuance price of such class or series of capital stock (as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to such class or series after the Effective Time) and (2) multiplying such fraction by an amount equal to the Series C Original Issue Price; *provided* that if the Company declares, pays or sets aside, on the same date, a dividend on shares of more than one class or series of capital stock of the Company, the dividend payable to the holders of Series C Preferred Stock pursuant to this Section 1(b) shall be calculated based upon the dividend on the class or series of capital stock that would result in the highest Series C Preferred Stock dividend. Subject to Section 5(d)(iii), if the Majority Series C Holders elect to have the Series C Accruing Dividends paid in kind, on the payment date the Company shall issue to each holder a number of additional shares of Series C Preferred Stock equal to the sum of (x) the quotient obtained by dividing the Series C Accruing Dividends for such holder that were accrued as of immediately prior to the filing of the Sixth Amended Certificate of Incorporation of the Company by the Series C Original Issue Price, *plus* (y) the quotient obtained by dividing the Series C Accruing Dividends for such holder accruing from and after the filing of the Sixth Amended Certificate of Incorporation of the Company by the Series D Original Issue Price.

(c) From and after the Effective Time, holders of shares of Series B-1 Preferred Stock, in preference to the holders of shares of Junior Preferred Stock and Common Stock, shall be entitled to receive, when, as and if declared by the Board, but only out of funds that are legally available therefor, dividends on each outstanding share of Series B-1 Preferred Stock. Such dividends shall be payable only when, as and if declared by the Board and shall be non-cumulative.

(d) From and after the Effective Time, holders of shares of Junior Preferred Stock, in preference to the holders of shares of Common Stock, shall be entitled to receive, when, as and if declared by the Board, but only out of funds that are legally available therefor, dividends on each outstanding share of Junior Preferred Stock. Such dividends shall be payable only when, as and if declared by the Board and shall be non-cumulative.

(e) So long as any shares of Series Preferred are outstanding, the Company shall not pay or declare any dividend, whether in cash or property, or make any other distribution on the Common Stock, or purchase, redeem or otherwise acquire for value any shares of Common Stock until all dividends as set forth in Sections 1(a), 1(b), 1(c) and 1(d) above on the Series Preferred have been paid or declared and set apart, except for:

(i) acquisitions of shares of Common Stock by the Company pursuant to agreements that permit the Company to repurchase such shares at cost (or the lesser of cost or fair market value) upon termination of services to the Company; or

(ii) acquisitions of shares of Common Stock in exercise of the Company's right of first refusal to repurchase such shares.

(f) If dividends are paid on any share of Common Stock, the Company shall, subject to the dividend rights of Series D Preferred Stock under Section 1(a) above and Series C Preferred Stock under Section 1(b) above, pay an additional dividend on each outstanding share of Series B-1 Preferred Stock and Junior Preferred Stock in a per share amount (on an as-if-converted-to-Common Stock basis) equal to the amount paid or set aside for each share of Common Stock.

(g) The provisions of Sections 1(e) and 1(f) shall not apply to a dividend payable in Common Stock (in which case the provisions of Section 5(f) shall apply), or any redemption or repurchase of any outstanding securities of the Company pursuant to this Restated Certificate or otherwise unanimously approved by the Board.

(h) Notwithstanding anything herein to the contrary, on or prior to a Series D Accruing Dividend Event, the Board may designate a date by which the Series D Accruing Dividend shall no longer accrue pursuant to Section 1(a); *provided*, that such date shall be no earlier than 14 days prior to the effectiveness of such Series D Accruing Dividend Event (the "***Series D Accrual End Date***"). In the event that the Series D Accruing Dividend Event does not occur within 14 days of the Series D Accrual End Date determined by the Board, (i) the determination of such Series D Accrual End Date shall terminate and be of no further force or effect and the Board may determine a new Series D Accrual End Date pursuant to this Section 1(h), and (ii) the Series D Accruing Dividends will continue to accrue pursuant to Section 1(a) above as if the initial Series D Accrual End Date had not been designated.

(i) Notwithstanding anything herein to the contrary, on or prior to a Series C Accruing Dividend Event, the Board may designate a date by which the Series C Accruing Dividend shall no longer accrue pursuant to Section 1(b); *provided*, that such date shall be no earlier than 14 days prior to the effectiveness of such Series C Accruing Dividend Event (the "***Series C Accrual End Date***"). In the event that the Series C Accruing Dividend Event does not occur within 14 days of the Series C Accrual End Date determined by the Board, (i) the determination of such Series C Accrual End Date shall terminate and be of no further force or effect and the Board may determine a new Series C Accrual End Date pursuant to this Section 1(i), and (ii) the Series C Accruing Dividends will continue to accrue pursuant to Section 1(b) above as if no Series C Accrual End Date had not been designated.

2. VOTING RIGHTS.

(a) General Rights. In addition to any class or series voting right provided under this Restated Certificate, applicable law or otherwise, on any matter presented to the stockholders of the Company for their action or consideration at any meeting of stockholders of the Company (or by written consent of stockholders in lieu of a meeting), each holder of shares of Series Preferred shall be entitled to the number of votes

equal to the number of shares of Common Stock into which such shares of Series Preferred could be converted pursuant to Section 5 hereof immediately after the close of business on the record date fixed for such meeting, or the effective date of such written consent, and shall have voting rights and powers equal to the voting rights and powers of the Common Stock and shall be entitled to notice of any stockholders' meeting in accordance with the bylaws of the Company, as amended from time to time (the "***Bylaws***"). Except as otherwise provided herein or as required by law, the holders of shares of Series Preferred and the holders of shares of Common Stock shall vote together, and not as separate classes, on all matters to come before the stockholders. The number of authorized shares of Common Stock may be increased or decreased (but not below the number of shares of Common Stock then outstanding and the number of shares of Common Stock issuable upon conversion of shares of Preferred Stock that are then outstanding) by the affirmative vote of the holders of a majority of the then-outstanding shares of capital stock of the Company, voting together as a single class on an as-if-converted basis, irrespective of the provisions of Section 242(b)(2) of the DGCL.

(b) Election of Directors. Subject to the provisions of this Section 2(b), (i) the holders of record of the shares of Series C Preferred Stock, voting together as a separate class, shall be entitled to elect three (3) directors of the Company (the "***Series C Directors***"), (ii) the holders of record of the shares of Junior Preferred Stock, voting together as a single class on an as-if converted basis, shall be entitled to elect one (1) director of the Company (the "***Junior Preferred Director***" and together with the Series C Directors, the "***Preferred Directors***") and (iii) the holders of record of the shares of Common Stock and Series Preferred, voting together as a single class on an as-if-converted basis, shall be entitled to elect four (4) directors of the Company. Any director elected as provided in the preceding sentence may be removed without cause by, and only by, the affirmative vote of the holders of the shares of the class or series of capital stock entitled to elect such director or directors, given either at a special meeting

of such stockholders duly called for that purpose or pursuant to a written consent of stockholders. If the holders of shares of Series C Preferred Stock, Junior Preferred Stock or Common Stock and Series Preferred, as the case may be, fail to elect a sufficient number of directors to fill all directorships for which they are entitled to elect directors, voting exclusively and as a separate class, pursuant to the first sentence of this Section 2(b), then any directorship not so filled shall remain vacant until such time as the holders of the Series C Preferred Stock, Junior Preferred Stock or Common Stock and Series Preferred, as the case may be, elect a person to fill such directorship by vote or written consent in lieu of a meeting; and no such directorship may be filled by stockholders of the Company other than by the stockholders of the Company that are entitled to elect a person to fill such directorship, voting exclusively and as a separate class. At any meeting held for the purpose of electing a director, the presence in person or by proxy of the holders of a majority of the outstanding shares of the class or series of capital stock entitled to elect such director shall constitute a quorum for the purpose of electing such director. A vacancy in any directorship filled by the holders of any class or series of capital stock shall be filled only by vote or written consent in lieu of a meeting of the holders of such class or series of capital stock or by any remaining director or directors elected by the holders of such class or series pursuant to this Section 2(b). Subject to the special rights of the holders of one or more series of the Series Preferred to elect directors, any vacancies on the Board resulting from death, resignation, disqualification, retirement, removal or other causes and any newly created directorships resulting from any increase in the number of directors shall, unless the Board determines by resolution that any such vacancies or newly created directorships shall be filled by the stockholders, and except as otherwise provided by law or contractually among the Company and its stockholders, be filled only by the affirmative vote of a majority of the directors then in office, even though less than a quorum, or by a sole remaining director, and shall not be filled by the stockholders. Any director appointed in accordance with the preceding sentence shall hold office for a term until such director's successor shall have been elected and qualified or until his or her earlier death, resignation, disqualification, retirement or removal.

(c) Separate Vote of the Series Preferred.

(i) In addition to any other vote or consent required herein or by law, from and after the Effective Time, the Company shall not, and shall not permit its subsidiaries to, in either case directly or indirectly by amendment, merger, reorganization, consolidation or otherwise, do any of the following without (in addition to any other vote required by law or this Restated Certificate) the written consent or affirmative vote of the holders of at least a majority of the then-outstanding shares of Series Preferred, voting together as a single class on an as-if-converted basis (the "***Required Holders***"), given in writing or by vote at a meeting, and any such act or transaction entered into without such consent or vote shall be null and void ab initio, and of no force or effect:

(A) amend, alter or repeal any provision of this Restated Certificate or the Bylaws;

(B) reclassify, alter or amend any outstanding shares of securities of the Company into shares having rights, preferences or privileges senior to or on a parity with any Series Preferred;

(C) create, authorize the creation of or issue, or obligate itself to create, authorize the creation of or issue, any capital stock or other security of any class or series, including, without limitation, any other security convertible into or exercisable or exchangeable for any equity security of any class or series, having rights, preferences or privileges senior to or on a parity with any Series Preferred;

(D) authorize or effect any merger, consolidation or reorganization of the Company or any Deemed Liquidation Event;

(E) authorize or effect any acquisition of another entity or all or substantially all of the assets of any entity, or permit any subsidiary of the Company to do so;

(F) liquidate, dissolve or wind up the Company;

(G) increase or decrease the authorized number of members of the Board;

(H) declare or pay any dividends or make any other distribution, directly or indirectly, with respect to any shares of Common Stock or Series Preferred now or hereafter outstanding; *provided, however*, that this restriction shall not apply to the Series D Accruing Dividends or the Series C Accruing Dividends; or

(I) repurchase, redeem or otherwise acquire any of the Company's equity securities (including, without limitation, warrants, options, and other rights to acquire equity securities); *provided, however,* that this restriction shall not apply to (i) the repurchase of

shares of Common Stock by the Company at cost (or the lesser of cost or the then-current fair market value thereof) from directors or employees of, or consultants or advisers to, the Company or any subsidiary pursuant to agreements in effect as of the Effective Time or agreements approved by the Board, including a majority of the Preferred Directors, after the Effective Time under which the Company has the option to repurchase such shares upon the termination of employment with or service to the Company or any subsidiary of the Company, (ii) the purchase of shares of Common Stock upon exercise by the Company of its right of first refusal with respect to such shares and (iii) a redemption pursuant to Section 6.

(ii) Without limiting the foregoing, the Company shall not, and shall not permit its subsidiaries to, in either case directly or indirectly by amendment, merger, reorganization, consolidation or otherwise, alter or change the powers, preferences or special rights of one or more series of the Series Preferred so as to affect them adversely, but not so affect the entire class of Series Preferred, without (in addition to any other vote required by law or this Restated Certificate) the written consent or affirmative vote of the holders of at least a majority of the then-outstanding shares of the series of Series Preferred so affected, voting together as a single class on

an as-if-converted basis, given in writing or by vote at a meeting, and any such act or transaction entered into without such consent or vote shall be null and void ab initio, and of no force or effect; *provided, however*, that, for the avoidance of doubt, the creation of a new class or series of equity security having a preference senior to, or on parity with, a series of Series Preferred, including, but not limited to, with respect to dividend rights, liquidation preferences or redemption rights, shall not be deemed to adversely alter or change the powers, preferences or special rights of such series of Series Preferred.

(d) Separate Vote of the Series D Preferred Stock. In addition to any other vote or consent required herein or by law, from and after the Effective Time, the Company shall not, and shall not permit its subsidiaries to, in either case directly or indirectly by amendment, merger, reorganization, consolidation or otherwise, do any of the following without (in addition to any other vote required by law or this Restated Certificate) the written consent or affirmative vote of the holders of at least 60% of the then outstanding shares of Series D Preferred Stock, voting together as a single class on an as-if-converted basis (the "***Required Series D Holders***"), given in writing or by vote at a meeting, and any such act or transaction entered into without such consent or vote shall be null and void ab initio, and of no force or effect:

(i) amend, alter or repeal any provision of the Restated Certificate in a manner that adversely affects the powers, preferences or rights of the Series D Preferred Stock under this Section 2(d) or any of Sections I.L.1(a), 3(a) or 6, *provided* that the creation, authorization or issuance of one or more new series of Preferred Stock that is senior or pari passu to the Series D Preferred Stock with respect to the distribution of assets on the liquidation, dissolution or winding up of the Company, the payment of dividends and rights of redemption shall not be deemed to adversely affect the powers, preferences or rights of the Series D Preferred Stock;

(ii) reclassify, alter or amend any outstanding shares of securities of the Company into shares having rights, preferences or privileges senior to or on a parity with any Series D Preferred Stock;

(iii) declare or pay any dividends or make any other distribution, directly or indirectly, with respect to any shares of Common Stock or Series Preferred now or hereafter outstanding; *provided*, however, that this restriction shall not apply to Series C Accruing Dividends paid in connection with a Series C Accruing Dividend Event in accordance with Section 1(b) and subject to the provisions of Section 1(a)(other than dividends paid in cash upon conversion of the Series C Preferred Stock) or the Series D Accruing Dividends;

(iv) repurchase, redeem or otherwise acquire any of the Company's equity securities (including, without limitation, warrants, options, and other rights to acquire equity securities); *provided, however,* that this restriction shall not apply to (i) the repurchase of shares of Common Stock by the Company at cost (or the lesser of cost or the then-current fair market value thereof) from directors or employees of, or consultants or advisers to, the Company or any subsidiary pursuant to agreements in effect as of the

Effective Time or agreements approved by the Board, including a majority of the Preferred Directors, after the Effective Time under which the Company has the option to repurchase such shares upon the termination of employment with or service to the Company or any subsidiary of the Company, (ii) the purchase of shares of Common Stock upon any exercise by the Company of its right of first refusal, (iii) a redemption of Series D Preferred Stock pursuant to Section 6 and (iv) a redemption of Series C Preferred Stock pursuant to Section 6 that is not inconsistent with the last sentence of Section 6(c); or

(v) agree to commit to any of the foregoing.

3. LIQUIDATION RIGHTS.

(a) Upon any liquidation, dissolution, or winding up of the Company, whether voluntary or involuntary, or any Deemed Liquidation Event (as defined below) (each a "***Liquidation Event***"), before any distribution or payment may be made to the holders of any shares of Series C Preferred Stock, Series B-1 Preferred Stock, Junior Preferred Stock or Common Stock, the holders of Series D Preferred Stock then outstanding, by reason of their ownership of such stock, shall be entitled to be paid out of the assets of the Company legally available for distribution to its stockholders an amount per share equal to the Series D Original Issue Price, plus any Series D Accruing Dividends accrued but unpaid thereon, whether or not declared, together with any other dividends declared but unpaid thereon (the "***Series D Liquidation Preference***"). If upon any Liquidation Event, the assets of the Company legally available for distribution to its stockholders shall be insufficient to make payment in full to the holders of shares of Series D Preferred Stock of the Series D Liquidation Preference, then such assets shall be distributed among the holders of shares of Series D Preferred Stock at the time outstanding, ratably in proportion to the full amounts to which they would otherwise be respectively entitled under this Section 3(a).

(b) Upon any Liquidation Event, after the payment in full of the Series D Liquidation Preference as set forth in Section 3(a) above and before any distribution or payment may be made to the holders of any shares of Series B-1 Preferred Stock, Junior Preferred Stock or Common Stock, the holders of shares of Series C Preferred Stock then outstanding, by reason of their ownership of such stock, shall be entitled to be paid out of the assets of the Company legally available for distribution to its stockholders an amount per share equal to the Series C Original Issue Price, plus any Series C Accruing Dividends accrued but unpaid thereon, whether or not declared, together with any other dividends declared but unpaid thereon (the "***Series C Liquidation Preference***"). If upon any Liquidation Event, the assets of the Company legally available for distribution to its stockholders (after payment in full of the Series D Liquidation Preference pursuant to Section 3(a)) shall be insufficient to make payment in full to the holders of shares of Series C Preferred Stock of the Series C Liquidation Preference, then such assets shall be distributed among the holders of shares of Series C

Preferred Stock at the time outstanding, ratably in proportion to the full amounts to which they would otherwise be respectively entitled under this Section 3(b).

(c) Upon any Liquidation Event, after the payment in full of the Series D Liquidation Preference as set forth in Section 3(a) and Series C Liquidation Preference as set forth in Section 3(b) above and before any distribution or payment may be made to the holders of any shares of Junior Preferred Stock or Common Stock, the holders of shares of Series B-1 Preferred Stock then outstanding, by reason of their ownership of such stock, shall be entitled to be paid out of the assets of the Company legally available for distribution to its stockholders an amount per share equal to the product of (i) the Series B-1 Original Issue Price multiplied by (ii) 1.5 (the "***Series B-1 Base Liquidation Amount***"), plus any dividends declared but unpaid thereon (the "***Series B-1 Liquidation Preference***"). If upon any Liquidation Event, the remaining assets of the Company legally available for distribution to its stockholders (after payment in full of the Series D Liquidation Preference pursuant to Section 3(a) and the Series C Liquidation Preference pursuant to Section 3(b)) shall be insufficient to make payment in full to the holders of shares of Series B-1 Preferred Stock of the Series B-1 Liquidation Preference, then such remaining assets shall be distributed among the holders of shares of Series B-1 Preferred Stock at the time outstanding, ratably in proportion to the full amounts to which they would be respectively entitled under this Section 3(c).

(d) Upon any Liquidation Event, after payment in full of the Series D Liquidation Preference as set forth in Section 3(a) above, the Series C Liquidation Preference as set forth in Section 3(b) above and the Series B-1 Liquidation Preference as set forth in Section 3(c) above and before any distribution or payment may be made to the holders of any shares of Common Stock, the holders of Junior Preferred Stock then outstanding, by reason of their ownership of such stock, shall be entitled to be paid out of the assets of the Company legally available for distribution to its stockholders, on a pari passu basis, an amount per share equal to (i) with respect to the Series B Preferred Stock, either (x) if the shares of Series B-1 Preferred Stock have been converted or, pursuant to Section 3(f), been deemed to be converted into shares of Common Stock immediately prior to the Liquidation Event (a "***Series B-1 Conversion***"), the Series B Original Issue Price plus any dividends declared but unpaid thereon, or (y) if a Series B-1 Conversion has not occurred, $2.106, as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to the Series B Preferred Stock, plus any dividends declared but unpaid thereon ((x) or (y), as the case may be, the "***Series B Liquidation Preference***"), and (ii) with respect to the Series A Preferred Stock, (A) if a Series B-1 Conversion has occurred, the Series A Original Issue Price plus any dividends declared but unpaid thereon, or (B) if a Series B-1 Conversion has not occurred, $1.330, as adjusted for any stock dividends, combinations, splits, recapitalizations and the like with respect to the Series A Preferred Stock, plus any dividends declared but unpaid thereon ((A) or (B), as the case may be, the "***Series A Liquidation Preference***" and collectively with the Series B Liquidation Preference, the Series B-1 Liquidation Preference, the Series C Liquidation Preference and the Series D Liquidation Preference, the "***Liquidation Preferences***"). If upon any Liquidation Event, the remaining assets of the Company legally available for distribution to its stockholders (after payment in full of the Series D Liquidation Preference pursuant to Section 3(a), the Series C Liquidation Preference pursuant to Section 3(b) and the Series B-1 Liquidation Preference pursuant to Section 3(c)) shall be insufficient to make payment in full to the holders of Junior Preferred Stock of the Series B Liquidation Preference and Series A

Liquidation Preference, then such remaining assets shall be distributed among the holders of shares of Junior Preferred Stock at the time outstanding, ratably in proportion to the full amounts to which they would be respectively entitled under this Section 3(d).

(e) Upon any Liquidation Event, after payment in full of the aggregate Liquidation Preferences pursuant to Sections 3(a), (b), (c) and (d) above, the remaining assets of the Company legally available for distribution or payment to its stockholders shall be distributed ratably among the holders of shares of Common Stock, the holders of shares of Series B Preferred Stock, the holders of shares of Series C Preferred Stock and the holders of the Series D Preferred Stock, on a pari passu and as-if-converted basis.

(f) Notwithstanding Sections 3(a) through (e) above, solely for purposes of determining the amount each holder of shares of Series Preferred is entitled to receive with respect to a Liquidation Event, each series of Series Preferred shall be treated as if such holder of Series Preferred had converted such holder's shares of Series Preferred into shares of Common Stock immediately prior to the Liquidation Event if, as a result of an actual conversion of such Series Preferred (including taking into account the operation of this Section 3(f)), such holder of such Series Preferred would receive (with respect to such Series Preferred), in the aggregate, an amount greater than the amount that would be distributed to such holder of such Series Preferred if such holder had not converted such Series Preferred into shares of Common Stock. If any holder of any Series Preferred shall be treated as if such holder had converted shares of Series Preferred into shares of Common Stock pursuant to this Section 3(f), then such holder shall not be entitled to receive any distribution pursuant to Sections 3(a), (b), (c) and (d) that would otherwise be made to such holder of Series Preferred.

4. DEEMED LIQUIDATION EVENTS.

(a) The Company shall not have the power to effect a Deemed Liquidation Event unless the consideration payable to the stockholders of the Company or the Company in such Deemed Liquidation Event shall be allocated among the holders of capital stock of the Company pursuant to Section 3 above.

(b) For the purposes of this Restated Certificate, a "***Deemed Liquidation Event***" means (i) any consolidation or merger of the Company or a subsidiary of the Company with or into any other corporation or other entity or person, or any other corporate reorganization, in which the stockholders of the Company immediately prior to such consolidation, merger or reorganization own, immediately after such consolidation, merger or reorganization, less than fifty percent (50%) of the voting power of the surviving or resulting entity or, if the surviving or resulting entity is a wholly owned subsidiary of another corporation, the parent corporation of the surviving or resulting entity (excluding any consolidation, merger or reorganization effected exclusively to change the domicile of the Company), (ii) any transfer, whether by merger, consolidation or otherwise, in a single transaction or series of related transactions to which the Company is a party, and in which all of the proceeds from such transaction or series of related transactions are received by the Company in cash, of the Company's

voting securities to a person or group of affiliated persons (as defined in Rule 13d-5(b) of the Securities Exchange Act of 1934, as amended) if, after such transfer, such person or group of affiliated persons would hold fifty percent (50%) or more of the outstanding voting securities of the Company (excluding any transaction or series of transactions for bona fide equity financing purposes in which cash proceeds are received by the Company or indebtedness of the Company is cancelled or converted or a combination thereof), or (iii) a sale, exclusive license, lease or other disposition of, in a single transaction or series of related transactions, all or substantially all of the assets, technology or intellectual property of the Company and its subsidiaries taken as a whole, or the sale or disposition, whether by merger or otherwise, of one or more subsidiaries of the Company if substantially all of the assets of the Company and its subsidiaries taken as a whole are held by such subsidiary or subsidiaries, except where such sale, exclusive license, lease or disposition is to a wholly-owned subsidiary of the Company.

(c) In any Deemed Liquidation Event, if the consideration to be received is securities of a corporation or other property other than cash, its value will be deemed its fair market value as determined in good faith by the Board on the date such determination is made (taking into account, if applicable, any restrictions on the free marketability of such assets, securities or other property, arising under applicable securities laws or otherwise).

(d) Notwithstanding any other provision set forth in Section 3 or this Section 4, in the event that any consideration payable to the Company or its stockholders in connection with any Deemed Liquidation Event is contingent upon the occurrence of any event or the passage of time (including, without limitation, any deferred purchase price payments, installment payments, payments made in respect of any promissory note issued in such transaction, payments from escrow, purchase price adjustment payments or payments in respect of "earnouts" or holdbacks), (i) such consideration shall not be deemed received by the Company or its stockholders or available for distribution to such stockholders unless and until such consideration is indefeasibly received by the Company or its stockholders in accordance with the terms of such Deemed Liquidation Event, (ii) the portion of such consideration that is not subject to any contingencies (the "***Initial Consideration***") shall be allocated among the holders of capital stock of the Company in accordance with Section 3 as if the Initial Consideration were the only consideration payable in connection with such Deemed Liquidation Event, and (iii) any additional consideration which becomes payable to the stockholders of the Company upon satisfaction of contingencies shall be allocated among the holders of capital stock of the Company in accordance with Section 3 after taking into account the previous payment of the Initial Consideration as part of the same transaction.

5. CONVERSION RIGHTS.

The holders of Series Preferred shall have the following rights with respect to the conversion of such Series Preferred into shares of Common Stock (the "***Conversion Rights***"):

(a) Optional Conversion. Subject to and in compliance with the provisions of this Section 5, each share of Series Preferred may be converted, at the option of the holder thereof, at any time after the issuance of such share and without the payment of additional consideration by the holder thereof, into fully paid and nonassessable shares of Common Stock. The number of shares of Common Stock to which a holder of shares of Series Preferred shall be entitled upon conversion of such shares of Series Preferred shall be the product obtained by multiplying the Series A Conversion Rate, Series B Conversion Rate, Series B-1 Conversion Rate, Series C Conversion Rate or Series D Conversion Rate, as applicable (each as defined and determined as provided in Section 5(b)), by the number of shares of Series A Preferred Stock, Series B Preferred Stock, Series B-1 Preferred Stock, Series C Preferred Stock or Series D Preferred Stock, as applicable, being converted.

(b) Conversion Rate. The conversion rate in effect at any time for conversion of shares of Series A Preferred Stock (the "***Series A Conversion Rate***") shall be the quotient obtained by dividing the Series A Original Issue Price by the Series A Conversion Price, calculated as provided in Section 5(c). The conversion rate in effect at any time for conversion of shares of Series B Preferred Stock (the "***Series B Conversion Rate***") shall be the quotient obtained by dividing the Series B Original Issue Price by the Series B Conversion Price, calculated as provided in Section 5(c). The conversion rate in effect at any time for conversion of shares of Series B-1 Preferred Stock (the "***Series B-1 Conversion Rate***") shall be the quotient obtained by dividing the Series B-1 Original Issue Price by the Series B-1 Conversion Price, calculated as provided in Section 5(c). The conversion rate in effect at any time for conversion of shares of Series C Preferred Stock (the "***Series C Conversion Rate***") shall be the quotient obtained by dividing the Series C Original Issue Price by the Series C Conversion Price, calculated as provided in Section 5(c). The conversion rate in effect at any time for conversion of shares of Series D Preferred Stock (the "***Series D Conversion Rate***") shall be the quotient obtained by dividing the Series D Original Issue Price by the Series D Conversion Price, calculated as provided in Section 5(c)

(c) Conversion Price. The conversion price for the Series A Preferred Stock shall initially be the Series A Original Issue Price (the "***Series A Conversion Price***"), the conversion price for the Series B Preferred Stock shall initially be the Series B Original Issue Price (the "***Series B Conversion Price***"), the conversion price for the Series B-1 Preferred Stock shall initially be the Series B-1 Original Issue Price (the "***Series B-1 Conversion Price***"), the conversion price for the Series C Preferred Stock shall initially be the Series C Original Issue Price (the "***Series C Conversion Price***") and the conversion price for the Series D Preferred Stock shall initially be the Series D Original Issue Price (the "***Series D Conversion Price***"). The Series A Conversion Price, the Series B Conversion Price, the Series B-1 Conversion Price, the Series C Conversion Price and Series D Conversion Price. in each case, shall be adjusted from time to time in accordance with this Section 5. All references to "***Conversion Price***" herein shall mean the Series A Conversion Price, the Series B Conversion Price, Series B-1 Conversion Price, the Series C Conversion Price or the Series D Conversion Price, as applicable, in each case as so adjusted.

(d) Mechanics of Conversion.

(i) Conversion into Common Stock. Each holder of shares of Series Preferred who desires to convert the same into shares of Common Stock pursuant to Section 5(a) shall surrender the certificate or certificates therefor, duly endorsed, at the office of the Company or any transfer agent for the Series Preferred, and shall give written notice to the Company at such office that such holder elects to convert the same. Such notice shall state the number of shares of Series Preferred being converted. Thereupon, subject to the restrictions of Sections 5(d)(ii) and 5(d)(iii) below, the Company shall promptly (i) issue and deliver at such office to such holder a certificate or certificates for the number of shares of Common Stock to which such holder is entitled upon conversion in accordance with the provisions hereof and a certificate for the number (if any) of the shares of Series Preferred represented by the surrendered certificate or certificates that were not converted into Common Stock, (ii) subject to Section 2(d), pay all declared but unpaid dividends on the shares of Series Preferred being converted in accordance with Section 1, all Series C Accruing Dividends accrued

and unpaid thereon, whether or not declared, and all Series D Accruing Dividends accrued and unpaid thereon, whether or not declared; *provided*, however, that subject to Section 5(d)(ii) and 5(d)(iii), respectively, if the holders of the Series C Preferred Shares or Series D Preferred Shares have elected to have the Series C Accruing Dividends or Series D Accruing Dividends, respectively, paid in kind, then the additional shares of Series C Preferred Stock or Series D Preferred Stock, as applicable, will be deemed to have been issued to such holders of Series Preferred immediately prior to any conversion of shares of Series Preferred, and (iii) pay in cash, at the fair market value of shares of Common Stock determined in good faith by the Board as of the date of conversion, the value of any fractional share of Common Stock otherwise issuable to any holder of shares of the Series Preferred as provided in Section 5(l). Such conversion shall be deemed to have been made at the close of business on the date of such surrender by such holder of the certificate of certificates representing the shares of Series Preferred to be converted, and the person entitled to receive the shares of Common Stock issuable upon such conversion shall be treated for all purposes as the record holder of such shares of Common Stock on such date.

(ii) Payment of Series D Accruing Dividends in Connection with an Initial Public Offering. Notwithstanding anything herein to the contrary, in the event that the Company shall make any payment of Series D Accruing Dividends in connection with the conversion of shares of Series D Preferred Stock into shares of Common Stock in accordance with this Section 5, and if such conversion is conditioned upon and/or effective immediately prior to the occurrence of an Initial Public Offering (as defined below), (i) the payment of any Series D Accruing Dividends in connection with such Initial Public Offering shall be paid in kind, effective immediately prior to the consummation of such Initial Public Offering, in the form of the issuance of additional shares of Common Stock and not involve the payment of any cash; (ii) the fair market value of each share of Common Stock to be used when determining the number of shares to be issued as a result of such Series D Accruing Dividends shall be as reflected on the cover of the final prospectus filed with the Securities and Exchange Commission in connection with such Initial Public Offering as the price being offered to the public per

share of Common Stock; and (iii) no fractional shares shall be issued or cash shall be paid by the Company in connection with the unconverted portion of any Series D Accruing Dividends as a result of the Company rounding down to the nearest whole share.

(iii) Payment of Series C Accruing Dividends in Connection with an Initial Public Offering. Notwithstanding anything herein to the contrary, in the event that the Company shall make any payment of Series C Accruing Dividends in connection with the conversion of shares of Series C Preferred Stock into shares of Common Stock in accordance with this Section 5, and if such conversion is conditioned upon and/or effective immediately prior to the occurrence of an Initial Public Offering, (i) the payment of any Series C Accruing Dividends in connection with such Initial Public Offering shall be paid in kind, effective immediately prior to the consummation of such Initial Public Offering, in the form of the issuance of additional shares of Common Stock and not involve the payment of any cash; (ii) the fair market value of each share of Common Stock to be used when determining the number of shares to be issued as a result of such Series C Accruing Dividends shall be as reflected on the cover of the final prospectus filed with the Securities and Exchange Commission in connection with such Initial Public Offering as the price being offered to the public per share of Common Stock; and (iii) no fractional shares shall be issued or cash shall be paid by the Company in connection with the unconverted portion of any Series C Accruing Dividends as a result of the Company rounding down to the nearest whole share.

(e) Adjustment for Stock Splits and Combinations. If at any time or from time to time after the Effective Time the Company effects a subdivision of the outstanding shares of Common Stock without a corresponding subdivision of the Preferred Stock, then the Conversion Price for each series of Series Preferred in effect immediately before that subdivision shall be proportionately decreased so that the number of shares of Common Stock issuable upon conversion of each share of such series shall be increased in proportion to such increase in the aggregate number of shares of Common Stock outstanding. Conversely, if at any time or from time to time after the Effective Time the Company combines the outstanding shares of Common Stock into a smaller number of shares without a corresponding combination of the Preferred Stock, the Conversion Price for each series of Series Preferred in effect immediately before the combination shall be proportionately increased so that the number of shares of Common Stock issuable upon conversion of each share of such series shall be decreased in proportion to such decrease in the aggregate number of shares of Common Stock outstanding. Any adjustment under this Section 5(e) shall become effective at the close of business on the date the subdivision or combination becomes effective.

(f) Adjustment for Common Stock Dividends and Distributions. If at any time or from time to time after the Effective Time the Company pays to holders of shares of Common Stock a dividend or other distribution in additional shares of Common Stock without a corresponding dividend or other distribution to holders of Series Preferred, then the Conversion Price for each series of Series Preferred in effect immediately before such event shall be decreased as of the time of such issuance as provided below:

(i) The Conversion Price for each series of Series Preferred shall be adjusted by multiplying the Conversion Price then in effect for such series by a fraction equal to:

(A) the numerator of which is the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance, and

(B) the denominator of which is the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance plus the number of shares of Common Stock issuable in payment of such dividend or distribution.

(ii) If the Company fixes a record date to determine which holders of shares of Common Stock are entitled to receive such dividend or other distribution, then the Conversion Price shall be fixed as of the close of business on such record date and the number of shares of Common Stock shall be calculated immediately prior to the close of business on such record date; and

(iii) Notwithstanding the foregoing, (A) if such record date is fixed and such dividend is not fully paid or if such distribution is not fully made on the date fixed therefor, then the Conversion Price for each series of Series Preferred shall be recomputed accordingly as of the close of business on such record date and thereafter the Conversion Price shall be adjusted pursuant to this Section 5(f) to reflect the actual payment of such dividend or distribution; and (B) no such adjustment shall be made if the holders of Series D Preferred Stock, Series C Preferred Stock, Series B-1 Preferred Stock, Series B Preferred Stock or Series A Preferred Stock, as applicable, simultaneously receive a dividend or other distribution of shares of Common Stock in a number equal to the number of shares of Common Stock as they would have received if all outstanding shares of Series D

Preferred Stock, Series C Preferred Stock, Series B-1 Preferred Stock, Series B Preferred Stock or Series A Preferred Stock, as applicable, had been converted into Common Stock on the date of such event.

(g) Adjustment for Reclassification, Exchange, Substitution, Reorganization, Merger or Consolidation. Subject to the provisions of Section 2(c), if at any time or from time to time after the Effective Time, the shares of Common Stock issuable upon the conversion of the Series Preferred are converted or exchanged into the same or a different number of shares of any class or classes of securities, cash or other property, whether by recapitalization, reclassification, merger, consolidation or otherwise (other than a Deemed Liquidation Event as defined in Section 4 or a subdivision or combination of shares or stock dividend or a reorganization, merger, consolidation or sale of assets provided for elsewhere in this Section 5), in any such event each holder of shares of Series Preferred shall then have the right to convert such shares into the kind and amount of securities, cash or other property receivable upon such recapitalization, reclassification, merger, consolidation or other change by holders of the maximum number of shares of Common Stock into which such shares of Series Preferred could have been converted immediately prior to such recapitalization,

reclassification, merger, consolidation or other change, all subject to further adjustment as provided herein or with respect to such other securities or property by the terms thereof. In any such case, appropriate adjustment shall be made in the application of the provisions of this Section 5 with respect to the rights of the holders of shares of Series Preferred after such recapitalization, reclassification, merger, consolidation or other change to the end that the provisions of this Section 5 (including adjustment of the applicable Conversion Price then in effect and the number of shares issuable upon conversion of the shares of Series Preferred) shall be applicable, after that event and as nearly equivalent as practicable, in relation to any securities or other property thereafter deliverable upon conversion of the shares of Series Preferred.

(h) Sale of Shares Below Conversion Price.

(i) If at any time or from time to time after the Effective Time, the Company issues or sells, or is deemed by the express provisions of this Section 5(h) to have issued or sold, Additional Shares of Common Stock (as defined below), other than as provided in Section 5(f) or 5(g) above, without consideration or for an Effective Price (as defined below) less than (i) with respect to the Series D Preferred Stock, the Series D Conversion Price in effect immediately prior to such issuance or sale, or (ii) with respect to the Series C Preferred Stock, Series B-1 Preferred Stock or Junior Preferred Stock, the Series C Conversion Price in effect immediately prior to such issuance or sale (a "***Qualifying Dilutive Issuance***"), then and in each such case, the Conversion Price for such series of Series Preferred in effect immediately prior to such issuance or sale shall be reduced, as of the opening of business on the date of such issuance or sale, to a price determined by multiplying the Conversion Price for such series of Series Preferred in effect immediately prior to such issuance or sale by a fraction equal to:

(A) the numerator of which shall be (1) the number of shares of Common Stock deemed outstanding (as determined below) immediately prior to such issuance or sale, plus (2) the number of shares of Common Stock that the Aggregate Consideration (as defined below) received by the Company for the total number of Additional Shares of Common Stock so issued would purchase at the Conversion Price in effect immediately prior to such issuance or sale; and

(B) the denominator of which shall be the number of shares of Common Stock deemed outstanding (as determined below) immediately prior to such issue or sale plus the total number of Additional Shares of Common Stock so issued.

For the purposes of the preceding sentence, the number of shares of Common Stock deemed to be outstanding as of a given date shall be the sum of (1) the number of shares of Common Stock outstanding, (2) the number of shares of Common Stock issuable upon conversion of shares of Series Preferred outstanding immediately prior to such issuance or sale, and (3) the number of shares of Common Stock issuable upon exercise, exchange or conversion of all Options and Convertible Securities (each as defined below) outstanding immediately prior to such issuance or sale.

(ii) No adjustment in any Conversion Price shall be made in an amount less than one hundredth ($1/100^{th}$) of one cent per share. Any adjustment otherwise required by this Section 5(h) that is not required to be made to a Conversion Price due to the preceding sentence shall be included in any subsequent adjustment to such Conversion Price. In addition, no adjustment to the Conversion Price of a series of Series Preferred shall be made if the Effective Price is greater than the Conversion Price of such series in effect immediately prior to such issuance or sale of Additional Shares of Common Stock.

(iii) For the purpose of making any adjustment required under this Section 5(h), the aggregate consideration received by the Company for any issue or sale of securities (the "***Aggregate Consideration***") is defined as: (A) to the extent it consists of cash, it is computed at the net amount of cash received by the Company after deduction of any underwriting or similar commissions, compensation or concessions paid or allowed by the Company in connection with such issue or sale but without deduction of any expenses payable by the Company, (B) to the extent it consists of property other than cash, it is computed at the fair value of that property as determined in good faith by the Board, and (C) if Additional Shares of Common Stock, Convertible Securities or Options are issued or sold together with other stock or securities or other assets of the Company for a consideration that covers both, it is computed as the portion of the consideration so received that may be reasonably determined in good faith by the Board to be allocable to such Additional Shares of Common Stock, Convertible Securities or Options.

(iv) For the purpose of the adjustment required under this Section 5(h), if the Company at any time or from time to time on or after the Effective Time issues or sells, or fixes a record date for the determination of holders of any class of securities entitled to receive, (A) any Preferred Stock or other stock, evidence of indebtedness, warrants, purchase rights or other securities convertible into or exchangeable for Additional Shares of Common Stock, but excluding Options (such convertible stock or securities being herein referred to as "***Convertible Securities***") or (B) any rights, warrants or options to subscribe for, purchase or otherwise acquire Additional Shares of Common Stock or Convertible Securities (collectively, the "***Options***"), in each case the Company shall be deemed (x) to have issued, at the time of the issuance of such Options or Convertible Securities or, in case such a record date shall have been fixed, as of the close of business on such record date, the maximum number of Additional Shares of Common Stock (as set forth in the instrument relating thereto, assuming the satisfaction of any conditions to exercisability, convertibility or exchangeability but without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon exercise, exchange or conversion thereof and (y) to have received as Aggregate Consideration for the issuance of such shares an amount equal to the total amount of the consideration, if any, received by the Company for the issuance of such Options or Convertible Securities plus:

(A) in the case of Options, the minimum amounts of consideration (as set forth in the instrument relating thereto, without regard to

any provision contained therein for a subsequent adjustment of such consideration), if any, payable to the Company upon the exercise of such Options; and

(B) in the case of Convertible Securities, the minimum amounts of consideration (as set forth in the instrument relating thereto, without regard to any provision contained therein for a subsequent adjustment of such consideration), if any, payable to the Company upon the conversion thereof (other than by cancellation of liabilities or obligations evidenced by such Convertible Securities); *provided* that if the minimum amounts of such consideration cannot be ascertained, but are a function of antidilution or similar protective clauses, the Company shall be deemed to have received the minimum amounts of consideration without reference to such clauses.

(v) If the terms of any Option or Convertible Security, the issuance of which resulted in an adjustment to the Conversion Price for any series of Series Preferred pursuant to the terms of Section 5(h)(i) above, are revised as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security to provide for either (1) any increase or decrease in the number of shares of Common Stock issuable upon the exercise, exchange or conversion of any such Option or Convertible Security or (2) any increase or decrease in the consideration payable to the Company upon such exercise, exchange or conversion, then, effective upon such increase or decrease becoming effective, such Conversion Price computed upon the original issue of such Option or Convertible Security (or upon the occurrence of a record date with respect thereto) shall be readjusted to the Conversion Price as would have obtained had such revised terms been in effect upon the original date of issuance of such Option or Convertible Security. Notwithstanding the foregoing, no readjustment pursuant to this clause (v) shall have the effect of increasing the applicable Conversion Price to an amount which exceeds the lower of (i) such applicable Conversion Price in effect immediately prior to the original adjustment made as a result of the issuance of such Option or Convertible Security, or (ii) the applicable Conversion Price that would have resulted from any issuances of Additional Shares of Common Stock (other than deemed issuances of Additional Shares of Common Stock as a result of the issuance of such Option or Convertible Security) between the original adjustment date and such readjustment date.

(vi) If the terms of any Option or Convertible Security (excluding Options or Convertible Securities which are themselves Exempted Securities (as defined below)), the issuance of which did not result in an adjustment to any applicable Conversion Price pursuant to the terms of Section 5(h)(i) (either because the consideration per share, determined pursuant to Section 5(h)(iv), of the Additional Shares of Common Stock subject thereto was equal to or greater than the applicable Conversion Price then in effect, or because such Option or Convertible Security was issued before the Effective Time), are revised after the Effective Time as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security to provide for either (1) any increase or decrease in the number of shares of Common Stock issuable upon the exercise, exchange or conversion of any such Option or Convertible Security or (2) any increase or decrease in the consideration payable to the

Company upon such exercise, exchange or conversion, then such Option or Convertible Security, as so amended or adjusted, and the Additional Shares of Common Stock subject thereto (determined in the manner provided in Section 5(h)(iv)) shall be deemed to have been issued effective upon such increase or decrease becoming effective.

(vii) No further adjustment of any applicable Conversion Price, as adjusted upon the issuance of such Options or Convertible Securities, shall be made as a result of the actual issuance of Additional Shares of Common Stock or the exercise of any such Options or the exchange or conversion of any such Convertible Securities. If any such Options or the conversion privilege represented by any such Convertible Securities shall expire without having been exercised, the applicable Conversion Price as adjusted upon the issuance of such Options or Convertible Securities shall be readjusted to a Conversion Price that would have been in effect had an adjustment been made on the basis that the only Additional Shares of Common Stock so issued were the Additional Shares of Common Stock, if any, actually issued or sold on the exercise, exchange or conversion of such Options or Convertible Securities, and such Additional Shares of Common Stock, if any, were issued or sold for the consideration actually received by the Company upon such exercise, exchange or conversion, plus the consideration, if any, actually received by the Company for the granting of all such Options, whether or not exercised, plus the consideration received for issuing or selling the Convertible Securities actually exchanged or converted, plus the consideration, if any, actually received by the Company (other than by cancellation of liabilities or obligations evidenced by such Convertible Securities) on the exchange or conversion of such Convertible Securities, *provided* that such readjustment shall not apply to prior conversions of Preferred Stock.

(viii) For the purpose of making any adjustment to a Conversion Price of a series of Series Preferred required under this Section 5(h), "***Additional Shares of Common Stock***" means all shares of Common Stock issued by the Company or deemed to be issued pursuant to this Section 5(h) (including shares of Common Stock subsequently reacquired or retired by the Company), other than:

(A) shares of Common Stock, Options or Convertible Securities issued upon conversion of the Series Preferred or as a dividend or distribution on the Series Preferred;

(B) shares of Common Stock, Options or Convertible Securities issued after the Effective Time to employees, officers or directors of, or consultants or advisors to, the Company or any subsidiary of the Company pursuant to stock purchase or stock option plans or other arrangements that are approved by the Board;

(C) shares of Common Stock issued upon exercise of Options or shares of Common Stock issued upon conversion or exchange of Convertible Securities, in each case provided that such Options or Convertible Securities are outstanding as of the Effective Time and such issuance is pursuant to the terms of such Options or Convertible Securities;

(D) shares of Common Stock or Convertible Securities issued for consideration other than cash pursuant to a merger, consolidation, acquisition, or similar business combination approved by the Board (including a majority of the Preferred Directors);

(E) shares of Common Stock, Options or Convertible Securities issued pursuant to any equipment loan or leasing arrangement, real property leasing arrangement, credit agreement, debt financing from a bank or similar financial or lending institution or other commercial transactions approved by the Board (including a majority of the Preferred Directors);

(F) shares of Common Stock issued in a registered public offering of Common Stock by the Company; or

(G) shares of Common Stock, Options or Convertible Securities issued by reason of a dividend, stock split, combination or other recapitalization by the Company on shares of Common Stock as provided in Sections 5(e), (f) and (g); or

(H) shares of Series D Preferred Stock (and Common Stock issuable upon conversion of the Series D Preferred Stock) issued pursuant to that certain Series D Preferred Stock Purchase Agreement, dated on or about the Effective Time, as may be amended from time to time (together with (A) through (G) above, collectively, the "***Exempted Securities***").

References to the Common Stock in the subsections of this clause (viii) above mean all shares of Common Stock issued by the Company or deemed to be issued pursuant to this Section 5(h). The "***Effective Price***" of Additional Shares of Common Stock means the quotient determined by dividing the total number of Additional Shares of Common Stock issued or sold, or deemed to have been issued or sold by the Company under this Section 5(h), into the Aggregate Consideration received, or deemed to have been received by the Company for such issue under this Section 5(h), for such Additional Shares of Common Stock.

(ix) No adjustment in any Conversion Price shall be made as a result of the issuance or deemed issuance of Additional Shares of Common Stock if the Company receives written notice from the Required Holders specifically stating that no such adjustment shall be made as a result of the issuance or deemed issuance of Additional Shares of Common Stock.

(x) If the Company issues or sells, or is deemed to have issued or sold, Additional Shares of Common Stock in a Qualifying Dilutive Issuance (the "***First Dilutive Issuance***"), then if the Company issues or sells, or is deemed to have issued or sold, Additional Shares of Common Stock in a Qualifying Dilutive Issuance other than the First Dilutive Issuance as part of one transaction or a series of related transactions (a "***Subsequent Dilutive Issuance***"), then and in each such case upon a Subsequent Dilutive Issuance the Conversion Price of a series of Series Preferred shall be

reduced to the Conversion Price that would have been in effect for such series had the First Dilutive Issuance and each Subsequent Dilutive Issuance all occurred on the closing date of the First Dilutive Issuance (and without giving effect to any additional adjustments as a result of any such subsequent issuances within such period).

(i) Certificate of Adjustment. In each case of an adjustment or readjustment of the Conversion Price of a series of Series Preferred for the number of shares of Common Stock or other securities issuable upon conversion of such series of Series Preferred, if the Series Preferred is then convertible pursuant to this Section 5, the Company, at its expense and as promptly as reasonably practicable, shall compute such adjustment or readjustment in accordance with the provisions hereof and prepare a certificate showing such adjustment or readjustment, and shall mail such certificate, by first class mail, postage prepaid, to each registered holder of shares of Series Preferred at the holder's address as shown in the Company's books. The certificate shall set forth such adjustment or readjustment, showing in detail the facts upon which such adjustment or readjustment is based, including a statement of (i) the consideration received or deemed to be received by the Company for any Additional Shares of Common Stock issued or sold or deemed to have been issued or sold, (ii) the Conversion Price at the time in effect for each series of Series Preferred, (iii) the number of Additional Shares of Common Stock and (iv) the type and amount, if any, of other property that at the time would be received upon conversion of the Series Preferred.

(j) Notices of Record Date. Upon (i) any taking by the Company of a record of the holders of any class of securities for the purpose of determining the holders thereof who are entitled to receive any dividend or other distribution, or (ii) any Deemed Liquidation Event or other capital reorganization of the Company, any reclassification or recapitalization of the capital stock of the Company, any merger or consolidation of the Company with or into any other corporation, or any voluntary or involuntary dissolution, liquidation or winding up of the Company, the Company shall mail to each holder of shares of Series Preferred at least ten (10) days prior to the record date specified therein (or such shorter period approved by the Required Holders) a notice specifying (A) the date on which any such record is to be taken for the purpose of such dividend or distribution and a description of such dividend or distribution, (B) the date on which any such Deemed Liquidation Event, reorganization, reclassification, transfer, consolidation, merger, dissolution, liquidation or winding up is expected to become effective, and (C) the date, if any, that is to be fixed as to when the holders of record of shares of Common Stock (or other securities) shall be entitled to exchange their shares of Common Stock (or other securities) for securities or other property deliverable upon such Deemed Liquidation Event, reorganization, reclassification, transfer, consolidation, merger, dissolution, liquidation or winding up.

(k) Automatic Conversion.

(i) Each share of Series Preferred shall automatically be converted into shares of Common Stock, based on the Conversion Price then in effect for such series of Series Preferred, immediately upon the closing of the Company's initial firmly underwritten public offering pursuant to an effective registration statement under

the Securities Act of 1933, as amended, covering the offer and sale of shares of Common Stock for the account of the Company (an "***Initial Public Offering***") in which either (A) (i) the per share price is at least $1.833 (as adjusted for stock splits, stock dividends, stock combinations and similar events after the Effective Time), and (ii) the gross cash proceeds to the Company (before underwriting discounts, commissions and fees) are at least $40,000,000, or (B) the affirmative vote or written consent of the Required Holders, voting together as a single class on an as-if-converted basis, approving such conversion in connection with an Initial Public Offering (a "***Qualified IPO***"). In addition, each share of Series Preferred shall automatically be converted into shares of Common Stock, based on the Conversion Price then in effect for such series, at any time upon the affirmative

vote or written consent of the Required Holders, voting together as a single class on an as-if-converted basis. The time of the closing of such firmly underwritten public offering or the date and time specified in such vote or written consent shall be referred to herein as the "***Mandatory Conversion Time***." Upon any such automatic conversion, any declared and unpaid dividends on shares of Series Preferred, all Series D Accruing Dividends accrued and unpaid thereon, whether or not declared, and all Series C Accruing Dividends accrued and unpaid thereon, whether or not declared, shall be paid in accordance with the provisions of Section 5(d).

(ii) Upon the occurrence of either of the events specified in Section 5(k)(i) above, the outstanding shares of Series Preferred shall be converted, at the Mandatory Conversion Time, automatically without any further action by the holders of such shares and whether or not the certificates representing such shares are surrendered to the Company or its transfer agent; *provided* that the Company shall not be obligated to issue certificates evidencing the shares of Common Stock issuable upon such conversion unless the certificates evidencing such shares of Series Preferred are either delivered to the Company or its transfer agent as provided below, or the holder notifies the Company or its transfer agent that such certificates have been lost, stolen or destroyed and executes an agreement satisfactory to the Company to indemnify the Company from any loss incurred by it in connection with such certificates. All holders of record of shares of Series Preferred shall be sent written notice of the Mandatory Conversion Time and the place designated for mandatory conversion of all such shares of Series Preferred pursuant to this Section 5(k). Upon receipt of such notice, the holders of shares of Series Preferred shall surrender the certificates representing such shares at the office of the Company or any transfer agent for the Series Preferred. Thereupon, there shall be issued and delivered to such holder promptly at such office and in its name as shown on such surrendered certificate or certificates, a certificate or certificates for the number of shares of Common Stock into which the shares of Series Preferred surrendered were convertible on the date on which such automatic conversion occurred, and the Company shall pay such holder (x) in cash such amount as provided in Section 5(l) in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion and (y) all declared and unpaid dividends on such shares of Series Preferred, all Series D Accruing Dividends accrued and unpaid thereon, whether or not declared, and all Series C Accruing Dividends accrued and unpaid thereon, whether or not declared.

(l) Fractional Shares. No fractional shares of Common Stock shall be issued upon conversion of shares of Series Preferred. All shares of Common

Stock (including fractions thereof) issuable upon conversion of more than one share of Series Preferred by a holder thereof shall be aggregated for purposes of determining whether the conversion would result in the issuance of any fractional share. If, after the aforementioned aggregation, the conversion would result in the issuance of any fractional share, the Company shall, subject to Sections 5(d)(ii) and 5(d)(iii), in lieu of issuing any fractional share, pay cash equal to the product of such fraction multiplied by the fair market value of a share of Common Stock as determined in good faith by the Board on the date of conversion.

(m) Reservation of Stock Issuable Upon Conversion. The Company shall at all times reserve and keep available out of its authorized but unissued shares of Common Stock, solely for the purpose of effecting the conversion of the shares of Series Preferred, such number of its shares of Common Stock as shall from time to time be sufficient to effect the conversion of all outstanding shares of Series Preferred. If at any time the number of authorized but unissued shares of Common Stock shall not be sufficient to effect the conversion of all then outstanding shares of Series Preferred, the Company shall take such corporate action as may, in the opinion of its counsel, be necessary to increase its authorized but unissued shares of Common Stock to such number of shares as shall be sufficient for such purpose, including, without limitation, engaging in best efforts to obtain the requisite stockholder approval of any necessary amendment to this Restated Certificate.

(n) Notices. Any notice required by the provisions of this Section 5 shall be in writing and shall be deemed effectively given: (i) upon personal delivery to the party to be notified, (ii) when sent by confirmed electronic mail or facsimile if sent during normal business hours of the recipient; if not, then on the next business day, (iii) three days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (iv) one day after deposit with a nationally recognized overnight courier, specifying next day delivery, with verification of receipt. All notices shall be addressed to each holder of record at the address of such holder last shown on the records of the Company.

(o) Payment of Taxes. The Company shall pay all taxes (other than taxes based upon income) and other governmental charges that may be imposed with respect to the issue or delivery of shares of Common Stock upon conversion of shares of Series Preferred, excluding any tax or other charge imposed in connection with any transfer involved in the issue and delivery of shares of Common Stock in a name other than that in which the shares of Series Preferred so converted were registered.

(p) Termination of Conversion Rights. In the event of a notice of redemption of any shares of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock pursuant to Section 6, the Conversion Rights of the shares designated for redemption shall terminate at the close of business on the last full day preceding the date fixed for redemption, unless the redemption price is not fully paid on such redemption date, in which case the Conversion Rights for such shares shall continue until such price is paid in full. In the event of a Liquidation Event, the Conversion Rights

shall, subject to Section 3(f), terminate at the close of business on the last full day preceding the date fixed for the payment of any such amounts distributable on such event to the holders of Preferred Stock.

6. REDEMPTION

(a) Redemption upon Request by Required Series D Holders. Shares of Series D Preferred Stock shall be redeemed by the Company out of funds legally available therefor at a per share price equal to the Series D Original Issue Price, plus any Series D Accruing Dividends accrued but unpaid thereon, whether or not declared, together with any other dividends declared but unpaid thereon (the "***Series D Redemption Price***"), in three (3) equal annual installments commencing sixty (60) days after receipt by the Company, at any time on or after the date that represents the fifth (5^{th}) anniversary of the Effective Time, of written notice from the Required Series D Holders, requesting redemption of all shares of Series D Preferred Stock (the date of each such installment being referred to as a "***Series D Redemption Date***"). On each Series D Redemption Date, the Company shall redeem on a pro rata basis in accordance with the number of shares of Series D Preferred Stock owned by each holder of Series D Preferred Stock, that number of outstanding shares of Series D Preferred Stock determined by dividing (i) the total number of shares of Series D Preferred Stock outstanding immediately prior to such Series D Redemption Date by (ii) the number of remaining Series D Redemption Dates (including the Series D Redemption Date to which such calculation

applies). If the Company does not have sufficient funds legally available to redeem on any Series D Redemption Date all shares of Series D Preferred Stock to be redeemed on such Series D Redemption Date, the Company shall redeem a pro rata portion of each holder's redeemable shares of Series D Preferred Stock out of funds legally available therefor, based on the respective amounts which would otherwise be payable in respect of the shares to be redeemed if the legally available funds were sufficient to redeem all such shares, and shall redeem the remaining shares of Series D Preferred Stock to have been redeemed as soon as practicable after the Company has funds legally available therefor.

(b) Series D Redemption Notice. The Company shall send written notice of the redemption pursuant to Section 6(a) (each a "***Series D Redemption Notice***") to each holder of record of Series D Preferred Stock not less than forty (40) days prior to each Series D Redemption Date. Each Series D Redemption Notice shall state:

(i) the number of shares of Series D Preferred Stock held by the holder that the Company shall redeem on the Series D Redemption Date specified in the Redemption Notice;

(ii) the Series D Redemption Date and the Series D Redemption Price;

(iii) the date on which the holder's right to convert such shares terminates (as determined in accordance with Section 5); and

(iv) that the holder is to surrender to the Company, at the office of the Company or its transfer agent, his, her or its certificate or certificates representing the shares of Series D Preferred Stock to be redeemed.

(c) Redemption upon Request by Majority Series C Holders. Shares of Series C Preferred Stock shall be redeemed by the Company out of funds legally available therefor at a per share price equal to the Series C Original Issue Price, plus any Series C Accruing Dividends accrued but unpaid thereon, whether or not declared, together with any other dividends declared but unpaid thereon (the "***Series C Redemption Price***"), in three (3) equal annual installments commencing sixty (60) days after receipt by the Company at any time on or after October 22, 2017, of written notice from the holders of at least a majority of then then-outstanding shares of Series C Preferred Stock, voting together as a separate class (the "***Majority Series C Holders***"), requesting redemption of all shares of Series C Preferred Stock (the "***Series C Redemption Request***", the date of each such installment being referred to as a "***Series C Redemption Date***"). On each Series C Redemption Date, the Company shall redeem (i) on a pro rata basis in accordance with the number of shares of Series C Preferred Stock owned by each holder of Series C Preferred Stock, that number of outstanding shares of Series C Preferred Stock determined by dividing (x) the total number of shares of Series C Preferred Stock outstanding immediately prior to such Series C Redemption Date by (y) the number of remaining Series C Redemption Dates (including the Series C Redemption Date to which such calculation applies) and (ii) all shares of Series D Preferred Stock at a price per share equal to the Series D Redemption Price, in a single payment occurring not more than thirty (30) days after receipt by the Company of the Series C Redemption Request. If on the Series C Redemption Date Delaware law governing distributions to stockholders prevents the Company from redeeming all shares of Series C Preferred Stock and Series D Preferred Stock to be redeemed, the Company shall ratably redeem (i) the maximum number of shares of Series D Preferred Stock that it may redeem consistent with such law based on the respective amounts which would otherwise be payable in respect of the shares of Series D Preferred Stock to be redeemed if the Company were allowed to redeem all such shares, and shall redeem the remaining shares as soon as it may lawfully do so under such law and (ii) after the redemption of all shares of Series D Preferred Stock, the maximum number of shares of Series C Preferred Stock that it may redeem consistent with such law based on the respective amounts which would otherwise be payable in respect of the shares of Series C Preferred Stock to be redeemed if the Company were allowed to redeem all such shares, and shall redeem the remaining shares as soon as it may lawfully do so under such law.

(d) Series C Redemption Notice. The Company shall send written notice of the redemption pursuant to Section 6(c) (each a "***Series C Redemption Notice***") to each holder of record of Series C Preferred Stock and Series D Preferred Stock not less than forty (40) days prior to each Series C Redemption Date. Each Series C Redemption Notice shall state:

(i) the number of shares of Series C Preferred Stock held by the holder that the Company shall redeem on the Series C Redemption Date specified in the Redemption Notice;

(ii) the Series C Redemption Date and the Series C Redemption Price;

(iii) the number of shares of Series D Preferred Stock held by the holder that the Company shall redeem on the Series C Redemption Date if the Required Series D Holders so elect and the Series D Redemption Price;

(iv) the date on which the holder's right to convert such shares terminates (as determined in accordance with Section 5); and

(v) that the holder is to surrender to the Company, at the office of the Company or its transfer agent, his, her or its certificate or certificates representing the shares of Series C Preferred Stock to be redeemed.

(e) Redemption upon Event of Default. If an Event of Default (as defined in the Exchange Agreement) occurs prior to the Termination Date (as defined in the Exchange Agreement), the Company shall redeem (i) all shares of Series B-1 Preferred Stock owned by the Office of Governor Economic Development and Tourism (the "***OOGEDT***") as of the Series B-1 Redemption Date (as defined below) at a price per share equal to the greater of (x) three (3) times the Series B-1 Base Liquidation Amount plus any dividends declared but unpaid thereon, (y) three (3) times the Series B-1 Original Issue Price and (z) three (3) times the Fair Market Value (as defined below) of a share of Series B-1 Preferred Stock (the "***Series B-1 Redemption Price***" and together with the Series D Redemption Price and the Series C Redemption Price, the "***Redemption Price***"), (ii) all shares of Series C Preferred Stock at a price per share equal to the Series C Redemption Price upon written request from the Majority Series C Holders (the "***Series C Participation Request***"), with a copy thereof to each other holder of Series C Preferred Stock, within ten (10) days after receipt of the Series B-1 Redemption Notice (as defined below) from the Company, in a single payment occurring not more than thirty (30) days after receipt by the Company from the OOGEDT of written notice requesting redemption of all shares of Series B-1 Preferred Stock (the "***Series B-1 Redemption Request***") and (iii) if any shares of Series C Preferred Stock shall be redeemed, all shares of Series D Preferred Stock at a price per share equal to the Series D Redemption Price, in a single payment occurring not

more than thirty (30) days after receipt by the Company of the Series B-1 Redemption Request. Upon receipt of a Series B-1 Redemption Request from the OOGEDT and, if applicable, a Series C Participation Request from the Majority Series C Holders, the Company shall apply all of its assets to any such redemption, and to no other corporate purpose, except to the extent prohibited by Delaware law governing distributions to stockholders. The date of such payment shall be referred to as the "***Series B-1 Redemption Date***." The Series D Redemption Date, the Series C Redemption Date and the Series B-1 Redemption Date are referred to together as the "***Redemption Date***." If on the Series B-1 Redemption Date Delaware law governing distributions to stockholders prevents the Company from redeeming all shares of Series B-1 Preferred Stock, Series C Preferred Stock and Series D Preferred Stock to be redeemed, the Company shall ratably redeem (i) the maximum number of shares of Series D Preferred Stock that it may redeem consistent with such law based on the respective amounts which would otherwise be payable in respect of the shares of Series D Preferred Stock to be redeemed if the Company were allowed to redeem all such shares,

and shall redeem the remaining shares as soon as it may lawfully do so under such law, (ii) after the redemption of all shares of Series D Preferred Stock, the maximum number of shares of Series C Preferred Stock that it may redeem consistent with such law based on the respective amounts which would otherwise be payable in respect of the shares of Series C Preferred Stock to be redeemed if the Company were allowed to redeem all such shares, and shall redeem the remaining shares as soon as it may lawfully do so under such law and (iii) after the redemption of all shares of Series D Preferred Stock and Series C Preferred Stock, the maximum number of shares of Series B-1 Preferred Stock that it may redeem consistent with such law based on the respective amounts which would otherwise be payable in respect of the shares of Series B-1 Preferred Stock to be redeemed if the Company were allowed to redeem all such shares, and shall redeem the remaining shares as soon as it may lawfully do so under such law. For purposes of this Section 6(e) only, the "***Fair Market Value***" of a share of Series B-1 Preferred Stock shall be the per share price of the last Company's offer and sale of preferred stock to a third party in a bona fide transaction before the date of the Series B-1 Redemption Request. The rights of the OOGEDT to redeem shares of Series B-1 Preferred Stock pursuant to this Section 6(e) are personal to the OOGEDT, may not be assigned by the OOGEDT and shall terminate with respect a share of Series B-1 Preferred Stock upon any sale, exchange, transfer, gift, encumbrance, assignment, pledge, mortgage, hypothecation or other disposition by the OOGEDT of such share of Series B-1 Preferred Stock.

(f) Series B-1 Redemption Notice. The Company shall send written notice of the Series B-1 Redemption Request (each a "***Series B-1 Redemption Notice***") to each holder of record of Series C Preferred Stock and Series D Preferred Stock within five (5) days after receipt of the Series B-1 Redemption Request from the OOGEDT. Each Series B-1 Redemption Notice shall state:

(i) the number of shares of Series B-1 Preferred Stock held by the OOGEDT and the Series B-1 Redemption Date;

(ii) the number of shares of Series D Preferred Stock held by the holder that the Company shall redeem on the Series B-1 Redemption Date, as applicable, and the Series D Redemption Price;

(iii) the number of shares of Series C Preferred Stock held by the holder that the Company shall redeem on the Series B-1 Redemption Date if the Majority Series C Holders so elect and the Series C Redemption Price;

(iv) the date on which the holder's right to convert such shares terminates (as determined in accordance with Section 5); and

(v) that the holder is to surrender to the Company, at the office of the Company or its transfer agent, his, her or its certificate or certificates representing the shares of Series C Preferred Stock to be redeemed.

(g) Surrender of Certificates; Payment. On or before the applicable Redemption Date, each holder of shares of Series D Preferred Stock, Series C

Preferred Stock or Series B-1 Preferred Stock, as the case may be, to be redeemed on such Redemption Date, unless such holder has exercised his, her or its right to convert such shares as provided in Section 5(a), shall surrender the certificate or certificates representing such shares (or, if such registered holder alleges that such certificate has been lost, stolen or destroyed, an agreement reasonably acceptable to the Company to indemnify the Company against any claim that may be made against the Company on account of the alleged loss, theft or destruction of such certificate) to the Company at the office of the Company or its transfer agent, and thereupon the Redemption Price for such shares shall be payable to the order of the person whose name appears on such certificate or certificates as the owner thereof. In the event less than all of the shares of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock, as applicable, represented by a certificate are redeemed, a new certificate representing the unredeemed shares of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock shall promptly be issued to such holder. For the avoidance of doubt, in no event shall a holder of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock be entitled to receive both their respective Redemption Price pursuant to this Section 6 and their respective Liquidation Preferences pursuant to Section 3, and the right to receive their respective Redemption Price pursuant to this Section 6 shall terminate upon any payment of their respective Liquidation Preferences pursuant to Section 3.

(h) Rights Subsequent to Redemption. If on the applicable Redemption Date the Redemption Price payable upon redemption of the shares of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock, as the case may be, to be redeemed on such Redemption Date is paid or tendered for payment or deposited with an independent payment agent so as to be available therefor in a timely manner, then notwithstanding that the certificates evidencing any of the shares of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock, as applicable, so called for redemption shall not have been surrendered, dividends with respect to such shares of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock shall cease to accrue after such Redemption Date and all rights with respect to such shares shall forthwith after the Redemption Date terminate, except only the right of the holders to receive the Redemption Price without interest upon surrender of their certificate or certificates therefor. In the event that shares of Series D Preferred Stock, Series C Preferred Stock or Series B-1 Preferred Stock, as applicable, are not redeemed on a Redemption Date, such shares shall remain outstanding and shall be entitled to all of the rights, preferences and privileges provided herein until redeemed.

7. NO REISSUANCE OF THE SERIES PREFERRED.

No share or shares of Series Preferred acquired by the Company by reason of purchase, redemption, conversion or otherwise shall be reissued, and all such shares shall be retired and cancelled.

8. WAIVER.

Except as otherwise set forth in this Restated Certificate, any of the rights, powers, preferences and other terms of the Preferred Stock set forth herein may be waived on

behalf of all holders of Preferred Stock by the affirmative written consent or vote of the Required Holders. Notwithstanding the foregoing, if any such waiver is to a provision in this Restated Certificate that includes a requirement for a specific vote to take an action under such provision or to take an action with respect to the matters described in such provision, such waiver shall not be binding or effective unless waivers are obtained from stockholders holding the percentage of the applicable class of securities otherwise required to take such action.

9. NOTICES.

Except as explicitly provided herein, any notice required or permitted by the provisions of this Article Four to be given to a holder of shares of Series Preferred shall be mailed, postage prepaid, to the address last shown on the records of the Company, or given by electronic communication in compliance with the DGCL, and shall be deemed sent upon such mailing or electronic transmission.

ARTICLE FIVE

The business and affairs of the Company shall be managed by and under the direction of the Board.

ARTICLE SIX

Except as otherwise provided in this Restated Certificate, in furtherance and not in limitation of the powers conferred by statute, the Board is expressly authorized to adopt, amend or repeal in any respect any or all of the Bylaws.

ARTICLE SEVEN

Elections of directors need not be by written ballot unless the Bylaws shall so provide.

ARTICLE EIGHT

Meetings of stockholders of the Company may be held within or without the State of Delaware, as the Bylaws may provide. The books of the Company may be kept (subject to any provision of applicable law) outside the State of Delaware at such place or places as may be designated from time to time by the Board or in the Bylaws.

ARTICLE NINE

A director of the Company shall not be personally liable to the Company or its stockholders for monetary damages for breach of fiduciary duty as a director, except for liability (a) for any breach of the director's duty of loyalty to the Company or its stockholders, (b) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (c) under Section 174 of the DGCL, or (d) for any transaction from which the director derived an improper personal benefit. If the DGCL is amended to authorize the further elimination or limitation of the liability of directors, then the liability of a director of the Company, in addition to the limitation on personal liability provided in this Restated Certificate, shall be eliminated or limited to the fullest extent permitted by the DGCL as so amended. No

amendment to or repeal of this Article Nine shall apply to or have any effect on the liability or alleged liability of any director of the Company for or with respect to any acts or omissions of such director occurring prior to such amendment or repeal.

ARTICLE TEN

To the fullest extent permitted by applicable law, the Company is also authorized to provide indemnification of (and advancement of expenses to) its directors, officers and agents (and any other persons to which Delaware law permits the Company to provide indemnification) through Bylaw provisions, agreements with such directors, officers, agents or other persons, vote of stockholders or disinterested directors, or otherwise, in excess of the indemnification and advancement otherwise permitted by Section 145 of the DGCL, subject only to limits created by applicable Delaware law (statutory or non-statutory), with respect to actions for breach of duty to the Company, its stockholders, and others. Any amendment, repeal or modification of any of the foregoing provisions of this Article Ten shall not adversely affect any right or protection of any director, officer, agent, or other person existing at the time of, or increase the liability of any director, officer or agent of the Company or other person with respect to any acts or omissions of such director, officer, agent or other person occurring prior to, such repeal or modification.

ARTICLE ELEVEN

Subject to the provisions of this Restated Certificate, the Company reserves the right to amend, alter, change, or repeal any provision contained in this Restated Certificate, in the manner now or hereafter prescribed by applicable laws, and all rights conferred upon stockholders in this Restated Certificate are granted subject to this reservation.

ARTICLE TWELVE

The Company renounces, to the fullest extent permitted by law, any interest or expectancy of the Company in, or in being offered an opportunity to participate in, any Excluded Opportunity. An "***Excluded Opportunity***" is any matter, transaction or interest that is presented to, or acquired, created or developed by, or which otherwise comes into the possession of, (i) any director of the Company who is not an employee of the Company or any of its subsidiaries, or (ii) any holder of Preferred Stock or any partner, member, director, stockholder, employee or agent of any such holder, other than someone who is an employee of the Company or any of its subsidiaries (collectively, "***Covered Persons***"), unless such matter, transaction or interest is presented to, or acquired, created or developed by, or otherwise comes into the possession of, a Covered Person expressly and solely in such Covered Person's capacity as a director of the Company or arising directly from such Covered Person's interest in the Company.

ARTICLE THIRTEEN

Unless the Company consents in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware shall be the sole and exclusive forum for (a) any derivative action or proceeding brought on behalf of the Company, (b) any action asserting a claim of breach of a fiduciary duty owed by any director or officer of the Company to the Company or the Company's stockholders, (c) any action asserting a claim against the Company arising pursuant to any provision of the DGCL, this Restated Certificate or the Bylaws or (d) any

action asserting a claim against the Company governed by the internal affairs doctrine, as applied by the courts of the state of Delaware to corporations organized and existing under the DGCL.

The undersigned, being the duly elected Chief Executive Officer of the Company, for the purpose of amending and restating the Original Certificate, does make this Restated Certificate, hereby declaring and certifying that this is the act and deed of the Company and the facts stated in this Restated Certificate are true, and accordingly has hereunto executed this Restated Certificate as a duly authorized officer of the Company this 27th day of March, 2015.

MIRNA THERAPEUTICS, INC.

/S/ PAUL LAMMERS
Paul Lammers, M.D., M.Sc.
Chief Executive Officer

SIGNATURE PAGE TO
SIXTH AMENDED AND RESTATED CERTIFICATE OF INCORPORATION
OF
MIRNA THERAPEUTICS, INC.

MIRNA THERAPEUTICS, INC.
(a Delaware corporation)

BYLAWS

ARTICLE 1

OFFICES

Section 1.1. Registered Office. The registered office shall be in the City of Wilmington, County of New Castle, State of Delaware.

Section 1.2. Other Offices. The Corporation may also have offices at such other places, either within or without the State of Delaware, as the board of directors may from time to time to determine or as the business of the Corporation may require.

ARTICLE 2

MEETINGS OF STOCKHOLDERS

Section 2.1. Place of Meetings. All meetings of the stockholders shall be held at the office of the Corporation or at such other places as may be fixed from time to time by the board of directors, either within or without the State of Delaware, and stated in the notice of the meeting or in a duly executed waiver of notice of the meeting, or the board of directors, may in its sole discretion, determine that the meeting shall not be held at any place, but may instead be held solely by means of remote communication.

Section 2.2. Annual Meetings. Annual meetings of stockholders, commencing with the year 2008, shall be held at the time and place, if any, to be selected by the board of directors. If the day is a legal holiday, then the meeting shall be held on the next following business day. At the meeting, the stockholders shall elect a board of directors and transact such other business as may properly be brought before the meeting. Each election of directors shall be by written ballot, unless otherwise provided in the Certificate of Incorporation. If authorized by the board of directors, such requirement of a written ballot shall be satisfied by a ballot submitted by electronic transmission, provided, that any such electronic transmission must either set forth or be submitted with information from which it can be determined that the electronic transmission was authorized by the stockholder or proxyholder.

Section 2.3. Notice of Annual Meeting. Notice of the annual meeting stating the place, if any, date, and hour of the meeting shall be given in accordance with Section 2.4 of this Article to each stockholder entitled to vote at such meeting not less than 10 nor more than 60 days before the date of the meeting.

Section 2.4. Manner of Giving Notice; Affidavit of Notice. If mailed, notice to stockholders shall be deemed given when deposited in the United States mail, postage prepaid, directed to the stockholder at his address as it appears on the records of the Corporation. Without limiting the manner by which notice may otherwise be given effectively to stockholders, any notice to stockholders may be given by electronic transmission in the manner provided in

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Section 232 of the Delaware General Corporation Law. An affidavit of the secretary or an assistant secretary or of the transfer agent of the Corporation that the notice has been given shall, in the absence of fraud, be *prima facie* evidence of the facts stated in such affidavit.

Section 2.5. Voting List. The officer who has charge of the stock ledger of the Corporation shall prepare and make, at least 10 days before every meeting of stockholders, a complete list of the stockholders entitled to vote at the meeting, arranged in alphabetical order, and showing the address of each stockholder and the number of shares registered in the name of each stockholder. Such list shall be open to the examination of any stockholder, for any purpose germane to the meeting, during the whole time of the meeting as in the manner provided by law.

Section 2.6. Special Meetings. Special meetings of the stockholders, for any purpose or purposes, unless otherwise prescribed by statute or by the Certificate of Incorporation, may be called by the chairperson of the board, the chief executive officer or the president and shall be called by the chief executive officer, the president or secretary at the request in writing of a majority of the board of directors, or by the holders of ten percent or more of the outstanding shares of stock of the Corporation. Such request shall state the purpose or purposes of the proposed meeting.

Section 2.7. Notice of Special Meetings. Notice of a special meeting stating the place, if any, date, and hour of the meeting and the purpose or purposes for which the meeting is called, shall be given in accordance with Section 2.4 of this Article 2 not less than ten nor more than sixty days before the date of the meeting, to each stockholder entitled to vote at such meeting. Business transacted at any special meeting of the stockholders shall be limited to the purposes stated in the notice.

Section 2.8. Quorum. The holders of a majority of the stock issued and outstanding and entitled to vote at meetings of the stockholders, present in person or represented by proxy, shall constitute a quorum at all meetings of the stockholders for the transaction of business, except as otherwise provided by statute or by the Certificate of Incorporation. If, however, such quorum shall not be present or represented at any meeting of the stockholders, the stockholders entitled to vote at such meeting, present in person or represented by proxy, shall have power to adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum shall be present or represented. At such adjourned meeting at which a quorum shall be present or represented, any business may be transacted which might have been transacted at the meeting as originally notified. If the adjournment is for more than 30 days, or if after the adjournment a new record date is fixed for the adjourned meeting, a notice of the adjourned meeting shall be given to each stockholder of record entitled to vote at the meeting.

Section 2.9. Order of Business. At each meeting of the stockholders, one of the following persons, in the order in which they are listed (and in the absence of the first, the next, and so on), shall serve as chairperson of the meeting: chairperson of the board, chief executive officer, president, vice presidents (in the order of their seniority if more than one), and secretary. The order of business at each such meeting shall be as determined by the chairperson of the meeting. The chairperson of the meeting shall have the right and authority to prescribe such rules, regulations, and procedures and to do all such acts and things as are necessary or desirable for the proper conduct of the meeting, including, without limitation, the establishment of

procedures for the maintenance of order and safety, limitations on the time allotted to questions or comments on the affairs of the Corporation, restrictions on entry to such meeting after the time prescribed for the commencement thereof, and the opening and closing of the voting polls.

Section 2.10. Vote Required. Unless otherwise required by law or provided in the certificate of incorporation or these Bylaws, in all matters to come before the stockholders at any meeting other than the election of directors, the affirmative vote of the majority of shares present in person or represented by proxy at the meeting and entitled to vote on the subject matter shall be the act of the stockholders. Directors shall be elected by a plurality of the votes of the shares present in person or represented by proxy at the meeting and entitled to vote on the election of directors.

Section 2.11. Method of Voting. Unless otherwise provided in the Certificate of Incorporation, each stockholder shall at every meeting of the stockholders be entitled to one vote in person or by proxy for each share of the capital stock having voting power held by such stockholder, but no proxy shall be voted on after three years from its date, unless the proxy provides for a longer period.

Section 2.12. Action by Stockholders Without Meeting. Unless otherwise restricted by the Certificate of Incorporation or these bylaws, any action required or permitted to be taken at any annual or special meeting of the stockholders may be taken without a meeting, without notice and without a prior vote, if a consent or consents in writing or in accordance with Section 228 of the Delaware General Corporation Law, setting forth the action so taken, shall be signed by the holders of outstanding stock having not less than the minimum number of votes that would be necessary to authorize or take such action at a meeting at which all shares entitled to vote thereon were present and voted and shall be delivered to the Corporation by delivery to its registered office in Delaware, its principal place of business or an officer or agent of the Corporation or an officer or agent of the Corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Delivery made to a Corporation's registered office shall be by hand or by certified or registered mail, return receipt requested.

Section 2.13. Presence at Meetings. If authorized by the board of directors in its sole discretion, and subject to such guidelines and procedures as the board of directors may adopt, stockholders and proxyholders not physically present at the meeting of stockholders may by means of remote communication (a) participate in a meeting of stockholders and (b) be deemed present in person and vote at a meeting of stockholders whether such meeting is to be held at a designated place or solely by means of remote communication, provided, that (i) the Corporation shall implement reasonable measures to verify that each person deemed present and permitted to vote at the meeting by means of remote communication is a stockholder or proxyholder, (ii) the Corporation shall implement reasonable measures to provide such stockholders and proxyholders a reasonable opportunity to participate in the meeting and to vote on matters submitted to the stockholders, including an opportunity to read or hear the proceedings of the meeting substantially concurrently with such proceedings, and (iii) if any stockholder or proxyholder votes or takes other action at the meeting by means of remote communication, a record of such vote or other action shall be maintained by the Corporation.

ARTICLE 3

DIRECTORS

Section 3.1. General Powers. The business and affairs of the Corporation shall be managed by or under the direction of the board of directors, which may exercise all such powers of the Corporation and do all such lawful acts and things as are not by law or by the Certificate of Incorporation of the Corporation or by these Bylaws directed or required to be exercised or done by the stockholders.

Section 3.2. Approval of Indebtedness. The Corporation shall not create, incur or assume any indebtedness for borrowed money or capitalized lease obligations, except for trade debt incurred in the ordinary course of business, without the approval of the board of directors.

Section 3.3. Number of Directors. The number of directors constituting the board shall be such number as shall be from time to time specified by resolution of the board of directors; provided, that no director's term shall be shortened by reason of a resolution reducing the number of directors.

Section 3.4. Election, Qualification, and Term of Office of Directors. Directors shall be elected at each annual meeting of stockholders to hold office until the next annual meeting. Directors need not be stockholders unless so required by the Certificate of Incorporation or these Bylaws, which may prescribe other qualifications for directors. Each director, including a director elected to fill a vacancy, shall hold office until his successor is elected and qualified or until his earlier resignation or removal.

Section 3.5. Notification of Nominations. Subject to the rights of the holders of any class or series of stock having a preference over the common stock as to dividends or upon liquidation, nominations for the election of directors may be made by the board of directors or by any stockholder entitled to vote for the election of directors.

Section 3.6. Regular Meetings. Regular meetings of the board of directors may be held without notice at such times and at such places as shall from time to time be determined by the board.

Section 3.7. Special Meetings. Special meetings of the board may be called by the chairperson of the board, the chief executive officer or the president, and shall be called by the chief executive officer, the president or the secretary on the written request of two directors unless the board of directors consists of only one director, in which case special meetings shall be called by the chief executive officer, the president or the secretary on the written request of the sole director.

Section 3.8. Quorum, Majority Vote. At all meetings of the board, a majority of the entire board of directors shall constitute a quorum for the transaction of business and the act of a majority of the directors present at any meeting at which there is a quorum shall be the act of the board of directors, except as may be otherwise specifically provided by statute or by the Certificate of Incorporation. If a quorum shall not be present at any meeting of the board of

directors, the directors present at such meeting may adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum shall be present.

Section 3.9. Action Without Meeting. Unless otherwise restricted by the Certificate of Incorporation or these Bylaws, any action required or permitted to be taken at any meeting of the board of directors or of any committee of the board of directors may be taken without a meeting, if all members of the board or committee, as the case may be, consent to such action in writing, or by electronic transmission and the writing or writings or electronic transmission or transmissions are filed with the minutes of the proceedings of the board or committee. Such filing shall be in paper form if the minutes are maintained in paper form and shall be in electronic form if the minutes are maintained in electronic form. Such consent shall have the same force and effect as a unanimous vote at a meeting, and may be stated as such in any document or instrument filed with the Secretary of State of Delaware.

Section 3.10. Telephone and Other Meetings. Unless otherwise restricted by the Certificate of Incorporation or these Bylaws, members of the board of directors, or any committee designated by the board of directors, may participate in a meeting of the board of directors, or any committee, by means of conference telephone or other communications equipment by means of which all persons participating in the meeting can hear each other, and such participation in a meeting shall constitute presence in person at the meeting.

Section 3.11. Notice of Meetings. Notice of regular meetings of the board of directors or of any adjourned meeting of the board of directors need not be given. Notice of each special meeting of the board shall be mailed to each director, addressed to such director at such director's residence or usual place of business, at least two days before the day on which the meeting is to be held or shall be sent to such director at such place by telegraph or be given personally or by telephone, not later than the day before the meeting is to be held, but notice need not be given to any director who shall, either before or after the meeting, submit a signed waiver of such notice or who shall attend such meeting without protesting, prior to or at its commencement, the lack of notice to such director. Every such notice shall state the time and place but need not state the purpose of the meeting.

Section 3.12. Rules and Regulations. The board of directors may adopt such rules and regulations not inconsistent with the provisions of law, the Certificate of Incorporation of the Corporation, or these Bylaws for the conduct of its meetings and management of the affairs of the Corporation as the board may deem proper.

Section 3.13. Resignations. Any director of the Corporation may at any time resign by giving notice in writing or by electronic transmission to the board of directors, the chairperson of the board, the chief executive officer, the president, or the secretary of the Corporation. Such resignation shall take effect at the time specified in such notice or, if the time be not specified, upon receipt of such notice; and, unless otherwise specified in such notice, the acceptance of such resignation shall not be necessary to make it effective.

Section 3.14. Removal of Directors. Unless otherwise restricted by statute, by the Certificate of Incorporation, or by these Bylaws, any director or the entire board of directors may

be removed, with or without cause, by the holders of a majority of the shares then entitled to vote at an election of directors.

Section 3.15. Vacancies. Subject to the rights of the holders of any class or series of stock having a preference over the common stock of the Corporation as to dividends or upon liquidation, any vacancies on the board of directors resulting from death, resignation, removal, or other cause shall only be filled by the affirmative vote of a majority of the remaining directors then in office, even though less than a quorum of the board of directors, or by a sole remaining director, and newly created directorships resulting from any increase in the number of directors shall be filled by the board of directors, or if not so filled, by the stockholders at the next annual meeting of the stockholders or at a special meeting called for that purpose in accordance with Section 2.6 of Article 2 of these Bylaws. Any director elected in accordance with the preceding sentence of this Section shall hold office for the remainder of the full term of the class of directors in which the new directorship was created or the vacancy occurred and until such successor shall have been elected and qualified.

Section 3.16. Compensation of Directors. Unless otherwise restricted by the Certificate of Incorporation or these Bylaws, the board of directors shall have the authority to fix the compensation of directors. The directors may be paid their expenses, if any, of attendance at each meeting of the board of directors and may be paid a fixed sum for attendance at each meeting of the board of directors or a stated salary as director. No such payment shall preclude any director from serving the Corporation in any other capacity and receiving compensation for such service. Members of special or standing committees may be allowed like compensation for attending committee meetings.

ARTICLE 4

EXECUTIVE AND OTHER COMMITTEES

Section 4.1. Executive Committee. The board of directors may, by resolution adopted by a majority of the entire board, designate annually one or more of its members to constitute members or alternate members of an executive committee, which committee shall have and may exercise, between meetings of the board, all the powers and authority of the board in the management of the business and affairs of the Corporation, including, if such committee is so empowered and authorized by resolution adopted by a majority of the entire board, the power and authority to declare a dividend and to authorize the issuance of stock, and may authorize the seal of the Corporation to be affixed to all papers which may require it, except that the executive committee shall not have such power or authority with reference to:

(a) amending the Certificate of Incorporation of the Corporation;

(b) adopting an agreement of merger or consolidation involving the Corporation;

(c) recommending to the stockholders the sale, lease or exchange of all or substantially all of the property and assets of the Corporation;

(d) recommending to the stockholders a dissolution of the Corporation or a revocation of a dissolution;

(e) adopting, amending, or repealing any Bylaw;

(f) filling vacancies on the board or on any committee of the board, including the executive committee;

(g) fixing the compensation of directors for serving on the board or on any committee of the board, including the executive committee; or

(h) amending or repealing any resolution of the board which by its terms may be amended or repealed only by the board.

Section 4.2. Other Committees. The board of directors may, by resolution adopted by a majority of the entire board, designate from among its members one or more other committees, each of which shall, except as otherwise prescribed by law, have such authority of the board as may be specified in the resolution of the board designating such committee. A majority of all the members of such committee may determine its action and fix the time and place of its meetings, unless the board shall otherwise provide. The board shall have the power at any time to change the membership of, to increase or decrease the membership of, to fill all vacancies in, and to discharge any such committee, or any member of any such committee, either with or without cause.

Section 4.3. Procedure; Meetings; Quorum. Regular meetings of the executive committee or any other committee of the board of directors, of which no notice shall be necessary, may be held at such times and places as shall be fixed by resolution adopted by a majority of the members of such committee. Special meetings of the executive committee or any other committee of the board shall be called at the request of any member of such committee. Notice of each special meeting of the executive committee or any other committee of the board shall be sent by mail, telegraph, or telephone, or be delivered personally to each member of such committee not later than the day before the day on which the meeting is to be held, but notice need not be given to any member who shall, either before or after the meeting, submit a signed waiver of such notice or who shall attend such meeting without protesting, prior to or at its commencement, the lack of such notice to such member. Any special meeting of the executive committee or any other committee of the board shall be a legal meeting without any notice of such meeting having been given, if all the members of such committee shall be present at such meeting. Notice of any adjourned meeting of any committee of the board need not be given. The executive committee or any other committee of the board may adopt such rules and regulations not inconsistent with the provisions of law, the Certificate of Incorporation of the Corporation, or these Bylaws for the conduct of its meetings as the executive committee or any other committee of the board may deem proper. A majority of the executive committee or any other committee of the board shall constitute a quorum for the transaction of business at any meeting, and the vote of a majority of the members of such committee present at any meeting at which a quorum is present shall be the act of such committee. In the absence or disqualification of a member, the remaining members, whether or not a quorum, may fill a vacancy. The executive committee or any other committee of the board of directors shall keep written minutes

of its proceedings, a copy of which is to be filed with the secretary of the Corporation, and shall report on such proceedings to the board.

ARTICLE 5

NOTICES

Section 5.1. Method. Whenever, under the provisions of the statutes or of the Certificate of Incorporation or of these Bylaws, notice is required to be given to any director or stockholder, it shall not be construed to mean personal notice, but such notice may be given in writing, by mail, electronic mail, overnight delivery, facsimile or any other manner provided in Section 232 of the Delaware General Corporation Law, addressed to such director or stockholder, at his mailing address, electronic mail address, or facsimile number as it appears on the records of the Corporation, with postage on such notice prepaid (as applicable), and such notice shall be deemed to be given at the time when the same shall be deposited in the United States mail if sent by mail or when received if sent by electronic mail, overnight delivery, or facsimile. Notice to directors may also be given by telegram.

Section 5.2. Waiver. Whenever any notice is required to be given under the provisions of the statutes or of the Certificate of Incorporation or of these Bylaws, a written waiver of such notice, signed by the person or persons entitled to said notice or waiver by electronic transmission by such person, whether before or after the time stated in such waiver, shall be deemed equivalent to notice.

ARTICLE 6

OFFICERS

Section 6.1. Election, Qualification. The officers of the Corporation shall be chosen by the board of directors and shall be a president and a secretary. The board of directors may also choose a chairperson of the board, a chief executive officer, a chief operating officer, a chief financial officer, one or more vice presidents, a treasurer, one or more assistant secretaries and assistant treasurers and such other officers and agents as it shall deem necessary. Any number of offices may be held by the same person, unless the Certificate of Incorporation or these Bylaws otherwise provide.

Section 6.2. Salary. The salaries of all officers and agents of the Corporation shall be fixed by the board of directors.

Section 6.3. Term, Removal. Each officer shall hold office until such officer's successor is elected and qualified or until such officer's earlier resignation or removal. Any officer elected or appointed by the board of directors may be removed at any time by the affirmative vote of a majority of the board of directors. Any vacancy occurring in any office of the Corporation shall be filled by the board of directors.

Section 6.4. Resignation. Subject at all times to the right of removal as provided in Section 6.3 of this Article 6 and to the provisions of any employment agreement, any officer may

resign at any time by giving notice to the board of directors, the chief executive officer, the president, or the secretary of the Corporation. Any such resignation shall take effect at the date of receipt of such notice or at any later date specified provided that the chief executive officer or president or, in the event of the resignation of the chief executive officer or the president, the board of directors may designate an effective date for such resignation which is earlier than the date specified in such notice but which is not earlier than the date of receipt of such notice; and, unless otherwise specified in such notice, the acceptance of such resignation shall not be necessary to make it effective.

Section 6.5. Vacancies. A vacancy in any office because of death, resignation, removal, or any other cause may be filled for the unexpired portion of the term in the manner prescribed in these Bylaws for election to such office.

Section 6.6. Chairperson of the Board. The chairperson of the board, if there be such an officer, shall preside at all meetings of the stockholders and the board of directors and shall perform all duties incident to the office of chairperson of the board and as from time to time may be assigned to him or her by the board of directors. Except as otherwise provided by resolution of the board of directors, the chairperson of the board shall be ex-officio a member of all committees of the board of directors.

Section 6.7. Chief Executive Officer. The chief executive officer, if there be such an officer, shall, subject to the provisions of these Bylaws and to the direction and supervision of the board of directors, (a) have general and active management of the affairs of the Corporation and have general supervision of its officers, agents and employees; (b) in the absence of the chairperson of the board, preside at all meetings of the stockholders and the board of directors; (c) have primary responsibility for the implementation of the policies adopted from time to time by the board of directors; and (d) perform those other duties incident to the office of chief executive officer and as from time to time may be assigned to him or her by the board of directors.

Section 6.8. President. The president shall, subject to the provisions of these bylaws and to the direction and supervision of the board of directors, perform all duties incident to the office of president and as from time to time may be assigned to him or her by the board of directors. At the request of the chief executive officer or in the absence of the chief executive officer and the chairperson of the board, in the event of their inability or refusal to act, the president shall perform the duties of the chief executive officer, and when so acting shall have all the powers and be subject to all restrictions of the chief executive officer.

Section 6.9. Chief Operating Officer. The chief operating officer, if there be such an officer, shall, subject to the provisions of these Bylaws and to the direction and supervision of the board of directors and the chief executive officer, supervise the day to day operations of the Corporation and perform those other duties incident to the office of chief operating officer and as from time to time may be assigned to him or her by the board of directors or the chief executive officer.

Section 6.10. Chief Financial Officer. The chief financial officer, if there be such an officer, shall, subject to the provisions of these Bylaws and to the direction and supervision of

the board of directors and the chief executive officer, manage the financial affairs of the Corporation and perform those other duties incident to the office of chief financial officer and as from time to time may be assigned to him or her by the board of directors or the chief executive officer. If there is no chief financial officer, these duties shall be performed by the treasurer or such other person designated by the board of directors to perform such duties.

Section 6.11. Vice Presidents. Each vice president, including each executive vice president and each senior vice president, if there be such an officer (or if there is more than one, then each vice president), shall perform such duties as from time to time may be assigned to him or her by the board of directors, the chief executive officer or the president. In the absence of the chief executive officer, the president and the chairman of the board or, in the event of their inability or refusal to act, the vice president, if there be such an officer (or in the event there be more than one vice president, the vice presidents in the order designated by the directors, or, in the absence of any designation, then in the order of their election), shall perform the duties of the president and, when so acting, shall have all the powers of and be subject to all the restrictions upon the president. The vice presidents shall perform such other duties and have such other powers as the board of directors may from time to time prescribe.

Section 6.12. Secretary. The secretary shall attend all meetings of the board of directors and all meetings of the stockholders and record all the proceedings of the meetings of the Corporation and of the board of directors in a book to be kept for that purpose and shall perform like duties for the standing committees when required. He shall give, or cause to be given, notice of all meetings of the stockholders and special meetings of the board of directors, and shall perform such other duties as may be prescribed by the board of directors or president, under whose supervision he shall be. He shall have custody of the corporate seal of the Corporation and he, or an assistant secretary, shall have authority to affix the same to any instrument requiring it and when so affixed, it may be attested by his signature or by the signature of such assistant secretary. The board of directors may give general authority to any other officer to affix the seal of the Corporation and to attest the affixing by his signature.

Section 6.13. Assistant Secretary. The assistant secretary, or if there be more than one, the assistant secretaries in the order determined by the board of directors (or if there be no such determination, then in the order of their election) shall, in the absence of the secretary or in the event of his inability or refusal to act, perform the duties and exercise the powers of the secretary and shall perform such other duties and have such other powers as the board of directors may from time to time prescribe.

Section 6.14. Treasurer. The treasurer, if there be such an officer, shall have the custody of the corporate funds and securities and shall keep full and accurate accounts of receipts and disbursements in books belonging to the Corporation and shall deposit all moneys and other valuable effects in the name and to the credit of the Corporation in such depositories as may be designated by the board of directors. He shall disburse the funds of the Corporation as may be ordered by the board of directors, taking proper vouchers for such disbursements, and shall render to the president and the board of directors, at its regular meetings, or when the board of directors so requires, an account of all his transactions as treasurer and of the financial condition of the Corporation. If required by the board of directors, he shall give the Corporation a bond in such sum and with such surety or sureties as shall be satisfactory to the board of directors for the

faithful performance of the duties of his office and for the restoration to the Corporation, in case of his death, resignation, retirement, or removal from office, of all books, papers, vouchers, money, and other property of whatever kind in his possession or under his control belonging to the Corporation. If there is not a treasurer of the Corporation, then the duties set forth above shall be discharged by the President or such other officer as shall be designated by the board of directors.

Section 6.15. Assistant Treasurer. The assistant treasurer, or if there shall be more than one, the assistant treasurers in the order determined by the board of directors (or if there be no such determination, then in the order of their election), shall, in the absence of the treasurer or in the event of his inability or refusal to act, perform the duties and exercise the powers of the treasurer and shall perform such other duties and have such other powers as the board of directors may from time to time prescribe.

ARTICLE 7

INDEMNIFICATION OF DIRECTORS,
OFFICERS, EMPLOYEES, AND AGENTS

Section 7.1. Third-Party Actions. The Corporation shall indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending, or completed action, suit, or proceeding, whether civil, criminal, administrative, or investigative (other than an action by or in the right of the Corporation) by reason of the fact that such person is or was a director or officer of the Corporation, or is or was serving at the request of the Corporation as a director or officer of another corporation, partnership, joint venture, trust, or other enterprise, against all expenses (including attorney's fees), judgments, fines, and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit, or proceeding if such person acted in good faith and in a manner such person reasonably believed to be in or not opposed to the best interests of the Corporation, and, with respect to any criminal action or proceeding, had no reasonable cause to believe his or her conduct was unlawful. The termination of any action, suit, or proceeding by judgment, order, settlement, conviction, or upon a plea of nolo contendere or its equivalent, shall not, of itself, create a presumption that the person did not act in good faith and in a manner which such person reasonably believed to be in or not opposed to the best interests of the Corporation, and, with respect to any criminal action or proceeding, that such person had reasonable cause to believe that his or her conduct was unlawful.

The Corporation may indemnify any employee or agent of the Corporation, or any employee or agent serving at the request of the Corporation as an employee or agent of another corporation, partnership, joint venture, trust, or other enterprise, in the manner and to the extent that it shall indemnify any director or officer under this Section.

Section 7.2. Derivative Actions. The Corporation may indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending, or completed action or suit by or in the right of the Corporation to procure a judgment in its favor by reason of the fact that such person is or was a director, officer, employee, or agent of the Corporation, or is or was serving at the request of the Corporation as a director, officer, employee, or agent of another

corporation, partnership, joint venture, trust, or other enterprise, against all expenses (including attorneys' fees) actually and reasonably incurred by such person in connection with the defense or settlement of such action or suit if such person acted in good faith and in a manner such person reasonably believed to be in or not opposed to the best interests of the Corporation, except that no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable for negligence or misconduct in the performance of such person's duty to the Corporation unless and only to the extent that the Court of Chancery of Delaware or the court in which such action or suit was brought shall determine upon application that, despite the adjudication of liability but in view of all the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which the Court of Chancery of Delaware or such other court shall deem proper.

Section 7.3. Determination of Indemnification. Any indemnification under Section 7.1 or Section 7.2 of this Article (unless ordered by a court) shall be made by the Corporation only as authorized in the specific case upon a determination that indemnification of the director, officer, employee, or agent is proper in the circumstances because such person has met the applicable standard of conduct set forth in Section 7.1 or Section 7.2 of this Article. Such determination shall be made (a) by the board of directors by a majority vote of a quorum consisting of directors who were not parties to such action, suit, or proceeding, or (b) if such a quorum is not obtainable, or, even if obtainable, a quorum of disinterested directors so directs, by independent legal counsel in a written opinion, or (c) by the stockholders.

Section 7.4. Right to Indemnification. Notwithstanding the other provisions of this Article, to the extent that a director, officer, employee, or agent of the Corporation has been successful on the merits or otherwise in defense of any action, suit, or proceeding referred to in Section 7.1 or Section 7.2 of this Article, or in defense of any claim, issue, or matter in any such claim or issue, such person shall be indemnified against expenses (including attorneys' fees) actually and reasonably incurred by such person in connection with such defense.

Section 7.5. Advance of Expenses. Expenses incurred in defending a civil or criminal action, suit, or proceeding may be paid by the Corporation on behalf of a director, officer, employee, or agent in advance of the final disposition of such action, suit, or proceeding as authorized by the board of directors in the specific case upon receipt of an undertaking by or on behalf of the director, officer, employee, or agent to repay such amount unless it shall ultimately be determined that such person is entitled to be indemnified by the Corporation as authorized in this Article.

Section 7.6. Indemnification Not Exclusive. The indemnification provided by this Article shall not be deemed exclusive of any other rights to which any person seeking indemnification may be entitled under any law, agreement, vote of stockholders or disinterested directors, or otherwise, both as to action in such person's official capacity and as to action in another capacity while holding such office, and shall continue as to a person who has ceased to be a director, officer, employee, or agent and shall inure to the benefit of the heirs, executors, and administrators of such a person.

Section 7.7. Insurance. The Corporation may purchase and maintain insurance on behalf of any person who is or was a director, officer, employee, or agent of the Corporation, or

is or was serving at the request of the Corporation as a director, officer, employee, or agent of another corporation, partnership, joint venture, trust, or other enterprise against any liability asserted against such person and incurred by such person in any such capacity, or arising out of such person's status as such, whether or not the Corporation would have the power to indemnify such person against liability under the provisions of this Article.

Section 7.8. Definitions of Certain Terms. For purposes of this Article, references to "the Corporation" shall include, in addition to the resulting corporation, any constituent corporation (including any constituent of a constituent) absorbed in a consolidation or merger which, if its separate existence had continued, would have had power and authority to indemnify its directors, officers, employees, or agents, so that any person who is or was a director, officer, employee, or agent of such constituent corporation, or is or was serving at the request of such constituent corporation as a director, officer, employee, or agent of another corporation, partnership, joint venture, trust, or other enterprise, shall stand in the same position under the provisions of this Article with respect to the resulting or surviving corporation as such person would have with respect to such constituent corporation if its separate existence had continued.

For purposes of this Article, references to "other enterprises" shall include employee benefit plans; references to "fines" shall include any excise taxes assessed on a person with respect to an employee benefit plan; references to "serving at the request of the Corporation" shall include any service as a director, officer, employee, or agent of the Corporation which imposes duties on, or involves services by, such director, officer, employee, or agent with

respect to an employee benefit plan, its participants, or beneficiaries; and a person who acted in good faith and in a manner such person reasonably believed to be in the interest of the participants and beneficiaries of an employee benefit plan shall be deemed to have acted in a manner "not opposed to the best interests of the Corporation" as referred to in this Article.

Section 7.9. Liability of Directors. Notwithstanding any provision of the Certificate of Incorporation or any other provision in these Bylaws, no director shall be personally liable to the Corporation or any stockholder for monetary damages for breach of fiduciary duty as a director, except for any matter in respect of which such director shall be liable under Section 174 of Title 8 of the Delaware Code (relating to the Delaware General Corporation Law) or any amendment or successor provision to such provision or shall be liable by reason that, in addition to any and all other requirements for such liability, he (a) shall have breached his duty of loyalty to the Corporation or its stockholders, (b) shall not have acted in good faith, (c) shall have acted in a manner involving intentional misconduct or a knowing violation of law or, in failing to act, shall have acted in a manner involving intentional misconduct or a knowing violation of law or (d) shall have derived an improper personal benefit.

ARTICLE 8

CERTIFICATES OF STOCK

Section 8.1. Certificates. Every holder of stock in the Corporation shall be entitled to have a certificate, signed by, or in the name of the Corporation by, the chairman or vice chairman of the board of directors, or the president or a vice president and the treasurer or an assistant

treasurer, or the secretary or an assistant secretary of the Corporation, certifying the number of shares owned by him in the Corporation.

Section 8.2. Facsimile Signatures. Any of or all the signatures on the certificate may be facsimile. In case any officer, transfer agent, or registrar who has signed or whose facsimile signature has been placed upon a certificate shall have ceased to be such officer, transfer agent, or registrar before such certificate is issued, it may be issued by the Corporation with the same effect as if he were such officer, transfer agent, or registrar at the date of issue.

Section 8.3. Lost Certificates. The board of directors may direct a new certificate or certificates to be issued in place of any certificate or certificates previously issued by the Corporation alleged to have been lost, stolen, or destroyed, upon the making of an affidavit of that fact by the person claiming the certificate of stock to be lost, stolen, or destroyed. When authorizing such issue of a new certificate or certificates, the board of directors may, in its discretion and as a condition precedent to the issuance of such new certificate or certificates, require the owner of such lost, stolen, or destroyed certificate or certificates, or his legal representative, to advertise the same in such manner as it shall require and/or to give the Corporation a bond in such sum as it may direct as indemnity against any claim that may be made against the Corporation with respect to the certificate alleged to have been lost, stolen, or destroyed.

Section 8.4. Transfers of Stock. Upon surrender to the Corporation or the transfer agent of the Corporation of a certificate for shares duly endorsed or accompanied by proper evidence of succession, assignment, or authority to transfer, it shall be the duty of the Corporation to issue a new certificate to the person entitled to such certificate, cancel the old certificate and record the transaction upon its books.

Section 8.5. Fixing Record Date. In order that the Corporation may determine the stockholders entitled to notice of or to vote at any meeting of stockholders or any adjournment of any meeting of stockholders, or to express consent to corporate action in writing without a meeting, or to receive payment of any dividend or other distribution or allotment of any rights, or to exercise any rights in respect of any change, conversion, or exchange of stock or for the purpose of any other lawful action, the board of directors may fix, in advance, a record date, which shall not be more than 60 nor less than 10 days before the date of such meeting, nor more than 60 days prior to any other action. A determination of stockholders of record entitled to notice of or to vote at a meeting of stockholders shall apply to any adjournment of the meeting; provided, that the board of directors may fix a new record date for the adjourned meeting.

Section 8.6. Registered Stockholders. The Corporation shall be entitled to recognize the exclusive right of a person registered on its books as the owner of shares to receive dividends, and to vote as such owner, and to hold liable for calls and assessments a person registered on its books as the owner of shares, and shall not be bound to recognize any equitable or other claim to or interest in such share or shares on the part of any other person, whether or not it shall have express or other notice of such claim or interest, except as otherwise provided by the laws of Delaware.

ARTICLE 9

AFFILIATED TRANSACTIONS

Section 9.1. Validity. Except as otherwise provided for in the Certificate of Incorporation and except as otherwise provided in these Bylaws, if Section 9.2 is satisfied, no contract or transaction between the Corporation and any of its directors, officers, or security holders, or any corporation, partnership, association, or other organization in which any of such directors, officers, or security holders are directly or indirectly financially interested, shall be void or voidable solely because of this relationship, or solely because of the presence of the director, officer, or security holder at the meeting authorizing the contract or transaction, or solely because of his or their participation in the authorization of such contract or transaction or vote at the meeting for authorization of such contract or transaction, whether or not such participation or vote was necessary for the authorization of such contract or transaction.

Section 9.2. Disclosure; Approval; Fairness. Section 9.1 shall apply only if:

(a) the material facts as to the relationship or interest and as to the contract or transaction are disclosed or are known:

(i) to the board of directors (or committee of the board of directors) and it nevertheless in good faith authorizes or ratifies the contract or transaction by a majority of the directors present, each such interested director to be counted in determining whether a quorum is present but not in calculating the majority necessary to carry the vote; or

(ii) to the stockholders and they nevertheless authorize or ratify the contract or transaction by a majority of the shares present at a meeting considering such contract or transaction, each such interested person (stockholder) to be counted in determining whether a quorum is present and for voting purposes; or

(b) the contract or transaction is fair to the Corporation as of the time it is authorized or ratified by the board of directors (or committee of the board of directors) or the stockholders.

Section 9.3. Nonexclusive. This provision shall not be construed to invalidate a contract or transaction which would be valid in the absence of this provision.

ARTICLE 10

GENERAL PROVISIONS

Section 10.1. Dividends. Dividends upon the capital stock of the Corporation, subject to the provisions of the Certificate of Incorporation, if any, may be declared by the board of directors at any regular or special meeting, pursuant to law. Dividends may be paid in cash, in

property, or in shares of the capital stock, subject to the provisions of the Certificate of Incorporation.

Section 10.2. Reserves. Before payment of any dividend, there may be set aside out of any funds of the Corporation available for dividends such sum or sums as the directors from time to time, in their absolute discretion, think proper as a reserve or reserves to meet contingencies, or for equalizing dividends, or for repairing or maintaining any property of the Corporation, or for such other purpose as the directors shall think conducive to the interest of the Corporation, and the directors may modify or abolish any such reserve in the manner in which it was created.

Section 10.3. Checks. All checks or demands for money and notes of the Corporation shall be signed by such officer or officers or such other person or persons as the board of directors may from time to time designate.

Section 10.4. Fiscal Year. The fiscal year of the Corporation shall be fixed by resolution of the board of directors.

Section 10.5. Seal. The board of directors may adopt a corporate seal having inscribed on such seal the name of the Corporation, the year of its organization, and the words “Corporate Seal, Delaware.” The seal may be used by causing it or a facsimile of it to be impressed or affixed or reproduced or otherwise.

ARTICLE 11

AMENDMENTS

Section 11.1. Amendments. These Bylaws may be altered, amended, or repealed or new Bylaws may be adopted by a majority of the entire board of directors, at any meeting of the board of directors if notice of such alteration, amendment, repeal, or adoption of new Bylaws be contained in the notice of such meeting. The stockholders of the Corporation shall have the power to adopt, amend, or repeal any provisions of the Bylaws only to the extent and in the manner provided in the Certificate of Incorporation of the Corporation.

ARTICLE 12

ADVISORY COMMITTEES

Section 12.1. Advisory Committees. The board of directors may, in its discretion, establish one or more technical, strategic or scientific advisory committees and appoint one or more persons as members of such advisory committees to serve in such capacity at the pleasure of the board. Each member of an advisory committee shall be entitled to receive such amounts as may be fixed from time to time by the board of directors as compensation for attending committee meetings and may be reimbursed for all reasonable expenses in attending and returning from any committee meeting. No advisory committee may set policy or be part of the corporate governance of the Corporation, and no advisory committee member may be responsible for the implementation of strategies or, in his or her capacity as a member of such

committee, be involved in the management of the Corporation. Subject to the foregoing restrictions, the board may adopt a charter or other governing documents of any advisory board.

Exhibit 4.3

MIRNA THERAPEUTICS, INC.

SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT

THIS SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT (this "***Agreement***") is entered into as of this 22nd day of October, 2012, by and among **MIRNA THERAPEUTICS, INC**., a Delaware corporation (the "***Company***"), and each of the persons and entities listed on **Exhibit A** hereto (the **"*Investors***" and each individually an "***Investor***").

RECITALS

WHEREAS, certain of the Investors and the Company have previously entered into that certain Amended and Restated Investor Rights Agreement dated as of August 10, 2011 (the "***Prior Agreement***");

WHEREAS, the Prior Agreement may be amended, and any provision therein waived, with the written consent of the Company and certain Holders (as defined in the Prior Agreement) pursuant to Section 5.5 of the Prior Agreement;

WHEREAS, on the date of this Agreement, certain of the Investors (the "***Series C Purchasers***") are purchasing, severally and not jointly, shares of the Company's Series C Preferred Stock, par value $0.001 per share (the "***Series C Preferred Stock***"), pursuant to that certain Series C Preferred Stock Purchase Agreement dated as of the date hereof (the "***Purchase Agreement***"), by and among the Company and the Series C Purchasers (the "***Series C Financing***");

WHEREAS, the obligations of the Company and the Investors in the Purchase Agreement are conditioned upon the execution and delivery of this Agreement; and

WHEREAS, in connection with the consummation of the Series C Financing, the Company and the Investors have agreed to the registration rights, information rights, and other rights with respect to the Preferred Stock (as defined below) held by the Investors as set forth below and have agreed to amend and restate the Prior Agreement as set forth herein;

Now, THEREFORE, in consideration of these premises and for other good and valid consideration, the receipt and sufficiency of which are hereby acknowledged, the Company and the Investors who constitute the requisite parties necessary to amend the Prior Agreement hereby agree that the Prior Agreement shall be amended and restated in its entirety by this Agreement, and the parties hereto further agree as follows:

AGREEMENT

SECTION 1. DEFINITIONS.

As used in this Agreement the following terms shall have the following respective meanings:

(a) "***Affiliate***" means, with respect to any specified person, any other person who or which, directly or indirectly, controls, is controlled by, or is under common control with such specified person, including without limitation any partner, officer, director, manager or employee of such person and any venture capital or private equity fund now or hereafter existing that is controlled by or under common control with one or more general partners or managing members of, or shares the same management company with, such person.

(b) "***Common Stock***" means common stock, par value $0.001 per share, of the Company.

(c) "***Exchange Act***" means the Securities Exchange Act of 1934, as amended.

(d) "***Form S-3***" means such form under the Securities Act as in effect on the date hereof or any successor or similar registration form under the Securities Act subsequently adopted by the SEC which permits inclusion or incorporation of substantial information by reference to other documents filed by the Company with the SEC.

(e) "***GAAP***" means generally accepted accounting principles in the United States.

(f) "***Holder***" means any person owning of record Registrable Securities that have not been sold to the public or any assignee of record of such Registrable Securities in accordance with Section 2.9 hereof.

(g) "***Initial Offering***" means the Company's first firm commitment underwritten public offering of its Common Stock registered under the Securities Act.

(h) "***Investment Company Act***" means the Investment Company Act of 1940, as amended.

(i) "***NEA***" means New Enterprise Associates 14, L.P., NEA Ventures 2012, Limited Partnership and their respective Affiliates.

(j) "***Pfize***r" means Pfizer Inc. and its Affiliates.

(k) "***Preferred Directors***" has the meaning set forth in the Restated Certificate.

(l) "***Preferred Stock***" means, collectively, the Series A Preferred Stock, the Series B Preferred Stock, the Series B-1 Preferred Stock and the Series C Preferred Stock.

(m) "***Register***," "***registered***," and "***registration***" refer to a registration effected by preparing and filing a registration statement in compliance with the Securities Act, and the declaration or ordering of effectiveness of such registration statement or document.

(n) "***Registrable Securities***" means (a) Common Stock of the Company issuable or issued upon conversion of the Preferred Stock, (b) Common Stock of the Company held by the Investors (other than shares of Common Stock of the Company issued or issuable

upon exercise of options or other awards granted pursuant to stock purchase or stock option plans or other similar incentive plans or arrangements), (c) Common Stock of the Company held by a transferee or assignee of Registrable Securities who has agreed in writing to be bound by the terms of this Agreement under Section 2.9, and (d) any Common Stock of the Company issued as (or issuable upon the conversion or exercise of any warrant, right or other security which is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of, such above-described securities (other than shares of Common Stock of the Company issued or issuable upon exercise of options or other awards granted pursuant to stock purchase or stock option plans or other similar incentive plans or arrangements). Notwithstanding the foregoing, Registrable Securities shall not include any securities (i) sold by a person to the public either pursuant to a registration statement or Rule 144, (ii) sold in a private transaction in which the transferor's rights under Section 2 of this Agreement are not assigned or (iii) held by a Holder (together with its Affiliates) if, as reflected on the Company's list of stockholders, such Holder (together with its Affiliates) holds less than 1% of the Company's outstanding Common Stock (treating all shares of Preferred Stock on an as-converted basis), the Company has completed its Initial Offering and all shares of Common Stock of the Company issuable or issued upon conversion of the Shares held by and issuable to such Holder (and its Affiliates) may be sold pursuant to Rule 144 without limitation during any ninety (90) day period. A Holder of Registrable Securities need not convert such Registrable Securities into Common Stock prior to requesting registration hereunder but may make such request in contemplation of conversion of such Registrable Securities into Common Stock prior to the effectiveness of such registration.

(o) "***Registrable Securities then outstanding***" shall be the number of shares of the Company's Common Stock that are Registrable Securities and either (a) are then issued and outstanding or (b) are issuable pursuant to then exercisable or convertible securities.

(p) "***Registration Expenses***" shall mean all expenses incurred by the Company in complying with Sections 2.1, 2.2 and 2.3 hereof, including, without limitation, all registration and filing fees, printing and accounting expenses, fees and disbursements of counsel for the Company, reasonable fees and disbursements of a single special counsel for the selling Holders, blue- sky fees and expenses and the expense of any special audits incident to or required by any such registration (but excluding the compensation of regular employees of the Company which shall be paid in any event by the Company).

(q) "***Required Holders***" means the Investors holding at least a majority of the then outstanding shares of Preferred Stock.

(r) "***Restated Certificate***" means the Fourth Amended and Restated Certificate of Incorporation of the Company, as amended from time to time.

(s) "***Right of First Refusal Agreement***" means the Second Amended and Restated Right of First Refusal and Co-Sale Agreement of even date herewith by and among the Company, the Investors and certain other parties named therein.

(t) "***SEC***" or "***Commission***" means the Securities and Exchange Commission.

(u) "***Securities Act***" shall mean the Securities Act of 1933, as amended.

(v) "***Selling Expenses***" shall mean all underwriting discounts and selling commissions applicable to the sale of Registrable Securities.

(w) "***Series A Preferred Stock***" shall mean Series A preferred stock, par value $0.001 per share, of the Company.

(x) "***Series B Preferred Stock***" shall mean Series B preferred stock, par value $0.001 per share, of the Company.

(y) "***Series B-1 Preferred Stock***" shall mean Series B-1 preferred stock, par value $0.001 per share, of the Company.

(z) "***Shares***" shall mean the Preferred Stock held by the Investors listed on **Exhibit A** hereto and their permitted assigns.

(aa) "***Sofinnov***a" shall mean Sofinnova Venture Partners VIII, L.P. and its Affiliates.

(bb) "***Special Registration Statement***" shall mean (i) a registration statement relating to any employee benefit plan, (ii) a registration statement with respect to any corporate reorganization or transaction under Rule 145 of the Securities Act, including any registration statements related to the issuance or resale of securities issued in such a transaction, or (iii) a registration statement in which the only Common Stock being registered is Common Stock issued upon conversion of debt securities that are also being registered

(cc) "***Transfer***" shall mean any direct or indirect sale, transfer, assignment, exchange, pledge, hypothecation, mortgage or grant of a proxy, or any other encumbrance or disposition of an interest.

SECTION 2. REGISTRATION.

2.1 Demand Registration.

(a) Subject to the conditions of this Section 2.1, if the Company shall receive a written request from the Required Holders (for purposes of this Section 2.1, the "***Initiating Holders***") that the Company file a registration statement under the Securities Act covering the registration of at least twenty percent (20%) of shares of the Common Stock issuable or issued upon conversion of the Preferred Stock (the "***Preferred Stock Registrable Securities***"), then the Company shall, within fifteen (15) days after the receipt thereof, give written notice of such request to all Holders, and subject to the limitations of this Section 2.1, shall, as expeditiously as possible and in any event within sixty (60) days after receipt of the request from the Initiating Holders, file a registration statement under the Securities Act of all Registrable Securities that the Initiating Holders requested to be registered and any additional Registrable Securities that all other Holders request to be registered, as specified by notice given by each such other Holder to the Company within twenty (20) days after the date that the written notice by the Company referred to above is given.

(b) Notwithstanding the foregoing obligations, if the Company furnishes to the Initiating Holders a certificate signed by the Company's chief executive officer stating that in the good faith judgment of the Company's board of directors (the "***Board***") it would be materially detrimental to the Company and its stockholders for such registration statement to either become effective or remain effective for as long as such registration statement otherwise would be required to remain effective, because such action would (i) materially interfere with a significant acquisition, corporate reorganization, or other similar transaction involving the Company; (ii) require premature disclosure of material information that the Company has a bona fide business purpose for preserving as confidential or (iii) render the Company unable to comply with requirements under the Securities Act or Exchange Act, then the Company shall have the right to defer taking action with respect to such filing, and any time periods with respect to filing or effectiveness thereof shall be tolled correspondingly, for a period of not more than ninety (90) days after the request of the Initiating Holders is given; *provided*, *however*, that the Company may not invoke this right more than once in any twelve (12) month period; and *provided*, *further*, that the Company shall not register any securities for its own account or that of any other stockholder during such ninety (90) day period other than pursuant to a Special Registration Statement.

(c) If the Initiating Holders intend to distribute the Preferred Stock Registrable Securities covered by their request by means of an underwriting, they shall so advise the Company as a part of their request made pursuant to this Section 2.1 or any request pursuant to Section 2.3 and the Company shall include such information in the written notice referred to in Section 2.1(a) or Section 2.3(a), as applicable. In such event, the right of any Holder to include its Registrable Securities in such registration shall be conditioned upon such Holder's participation in such underwriting and the inclusion of such Holder's Registrable Securities in the underwriting to the extent provided herein. All Holders proposing to distribute their securities through such underwriting shall, together with the Company as provided in Section 2.5(e), enter into an underwriting agreement in customary form with the underwriter or underwriters selected for such underwriting by a majority in interest of the Initiating Holders (which underwriter or underwriters shall be reasonably acceptable to the Company). Notwithstanding any other provision of this Section 2.1 or Section 2.3, if the managing underwriter advises the Company that marketing factors require a limitation of the number of securities to be underwritten (including Preferred Stock Registrable Securities) then the Company shall so advise all Holders of Registrable Securities that would otherwise be underwritten pursuant hereto, and the number of shares that may be included in the underwriting shall be allocated to the Holders of such Registrable Securities on a *pro rata* basis based on the number of Registrable Securities held by all such Holders (including the Initiating Holders); *provided*, *however*, that the number of shares of Preferred Stock Registrable Securities to be included in such underwriting and registration shall not be reduced unless all other securities of the Company are first entirely excluded from the underwriting and registration. Any Registrable Securities excluded or withdrawn from such underwriting shall be withdrawn from the registration.

(d) The Company shall not be required to effect a registration pursuant to this Section 2.1:

(i) prior to the earlier of (A) the third anniversary of the date hereof or (B) one hundred eighty (180) days following the effective date of the registration statement pertaining to the Initial Offering;

(ii) after the Company has effected two (2) registrations pursuant to this Section 2.1, and such registrations have been declared or ordered effective;

(iii) if within fifteen (15) days of receipt of a written request from the Initiating Holders pursuant to Section 2.1(a), the Company gives notice to each of the Initiating Holders of the Company's intention to file a registration statement for its Initial Offering within ninety (90) days after receipt of such written request from the Initiating Holders, provided that the Company is actively employing in good faith commercially reasonable efforts to cause such registration statement to become effective during such period;

(iv) if the Initiating Holders propose to dispose of shares of Preferred Stock Registrable Securities that may be immediately registered on Form S-3 pursuant to a request made pursuant to Section 2.3 below; or

(v) in any particular jurisdiction in which the Company would be required to qualify to do business or to execute a general consent to service of process in effecting such registration, qualification or compliance unless the Company is already qualified to do business or subject to service of process, as applicable, in such jurisdiction and except as may be required by the Securities Act.

2.2 Piggyback Registrations. The Company shall notify all Holders of Registrable Securities in writing at least twenty (20) days prior to the filing of any registration statement under the Securities Act for purposes of a public offering of securities of the Company (including, but not limited to, registration statements relating to secondary offerings of securities of the Company, but excluding Special Registration Statements) and will afford each such Holder an opportunity to include in such registration statement, and the Company shall cause to be registered, all or part of such Registrable Securities held by such Holder. Each Holder desiring to include in any such registration statement all or any part of the Registrable Securities held by it shall, within fifteen (15) days after receipt of the above-described notice from the Company, so notify the Company in writing. Such notice shall state the intended method of disposition of the Registrable Securities by such Holder. If a Holder decides not to include all of its Registrable Securities in such registration statement filed by the Company, such Holder shall nevertheless continue to have the right to include any Registrable Securities in any subsequent registration statement or registration statements as may be filed by the Company with respect to offerings of its securities, all upon the terms and conditions set forth herein.

(a) Underwriting. If the registration statement under which the Company gives notice under this Section 2.2 is for an underwritten offering, the Company shall so advise the Holders of Registrable Securities. In such event, the right of any such Holder to be included in a registration pursuant to this Section 2.2 shall be conditioned upon such Holder's participation in such underwriting and the inclusion of such Holder's Registrable Securities in the underwriting to the extent provided herein. All Holders proposing to distribute their Registrable Securities through such underwriting shall enter into an underwriting agreement in

customary form with the underwriter or underwriters selected for such underwriting by the Company. Notwithstanding any other provision of this Agreement, if the underwriter determines in good faith that marketing factors require a limitation of the number of shares to be underwritten, the number of shares that may be included in the underwriting shall be allocated, first, to the Company; second, to the holders of Preferred Stock Registrable Securities (the "***Preferred Holders***") on a *pro rata* basis based on the total number of Preferred Stock Registrable Securities held by such Preferred Holders; third, to the Holders (other than the

Preferred Holders) on a *pro rata* basis based on the total number of Registrable Securities held by such Holders; and fourth, to any stockholder of the Company (other than a Holder) on a pro rata basis; *provided, however,* that no such reduction shall reduce the amount of securities of the selling Holders included in the registration below thirty percent (30%) of the total amount of securities included in such registration, unless such offering is the Initial Offering and such registration does not include shares of any other selling stockholders, in which event any or all of the Registrable Securities of the Holders may be excluded in accordance with the immediately preceding clause. In no event will shares of any other selling stockholder be included in such registration that would reduce the number of shares which may be included by Holders without the written consent of Holders of not less than a majority of the Registrable Securities (including a majority of the Preferred Stock Registrable Securities, if applicable) proposed to be sold in the offering. If any Holder disapproves of the terms of any such underwriting, such Holder may elect to withdraw therefrom by written notice to the Company and the underwriter, delivered at least ten (10) business days prior to the effective date of the registration statement. Any Registrable Securities excluded or withdrawn from such underwriting shall be excluded and withdrawn from the registration. For any Holder that is a partnership or corporation, the partners, retired partners, members, former members and stockholders of such Holder, or the estates and family members of any such partners and retired partners and any trusts for the benefit of any of the foregoing person shall be deemed to be a single "Holder," and any *pro rata* reduction with respect to such "Holder" shall be based upon the aggregate amount of shares carrying registration rights owned by all entities and individuals included in such "Holder," as defined in this sentence.

(b) Right to Terminate Registration. The Company shall have the right to terminate or withdraw any registration initiated by it under this Section 2.2 prior to the effectiveness of such registration whether or not any Holder has elected to include securities in such registration. The Registration Expenses of such withdrawn registration shall be borne by the Company in accordance with Section 2.4 hereof.

2.3 Form S-3 Registration. In case the Company shall receive from any Holder or Holders of Registrable Securities a written request or requests that the Company effect a registration on Form S-3 (or any successor to Form S-3) or any similar short-form registration statement and any related qualification or compliance with respect to all or a part of the Registrable Securities owned by such Holder or Holders, the Company shall:

(a) promptly (and in any event within fifteen (15) days after such written request is delivered) give written notice of the proposed registration, and any related qualification or compliance, to all other Holders of Registrable Securities; and

(b) as soon as practicable, effect such registration and all such qualifications and compliances as may be so requested and as would permit or facilitate the sale and distribution of all or such portion of such Holder's or Holders' Registrable Securities as are specified in such request, together with all or such portion of the Registrable Securities of any other Holder or Holders joining in such request as are specified in a written request given within fifteen (15) days after receipt of such written notice from the Company; *provided, however*, that the Company shall not be obligated to effect any such registration, qualification or compliance pursuant to this Section 2.3:

(i) if Form S-3 is not available for such offering by the Holders;

(ii) if the Holders, together with the holders of any other securities of the Company entitled to inclusion in such registration, propose to sell Registrable Securities and such other securities (if any) at an aggregate price to the public of less than one million dollars ($1,000,000);

(iii) if within fifteen (15) days of receipt of a written request from any Holder or Holders pursuant to this Section 2.3, the Company gives notice to such Holder or Holders of the Company's intention to make a public offering within ninety (90) days after receipt of such written request from such Holder or Holders, other than pursuant to a Special Registration Statement; *provided that* the Company is actively employing in good faith commercially reasonable efforts to cause such registration statement to become effective during such period; *provided, further*, that such Holders were permitted to register such shares as requested to be registered pursuant to Section 2.2 hereof without reduction by the underwriter thereof;

(iv) if the Company has, within the twelve (12) month period preceding the date of such written request, already effected two (2) registrations on Form S-3 for the Holders pursuant to this Section 2.3; or

(v) in any particular jurisdiction in which the Company would be required to qualify to do business or to execute a general consent to service of process in effecting such registration, qualification or compliance unless the Company is already qualified to do business or subject to service of process, as applicable, in such jurisdiction and except as may be required by the Securities Act.

(c) Subject to the foregoing, the Company shall file a Form S-3 registration statement covering the Registrable Securities and other securities so requested to be registered as soon as practicable after receipt of the requests of the Holders. Registrations effected pursuant to this Section 2.3 shall not be counted as demands for registration or registrations effected pursuant to Section 2.1.

(d) Notwithstanding the foregoing obligations, if the Company furnishes to the Holder or Holders requesting a registration pursuant to this Section 2.3 a certificate signed by the Company's chief executive officer stating that in the good faith judgment of the Board it would be materially detrimental to the Company and its stockholders for such registration statement to either become effective or remain effective for as long as such registration statement

otherwise would be required to remain effective, because such action would (i) materially interfere with a significant acquisition, corporate reorganization, or other similar transaction involving the Company; (ii) require premature disclosure of material information that the Company has a bona fide business purpose for preserving as confidential or (iii) render the Company unable to comply with requirements under the Securities Act or Exchange Act, then the Company shall have the right to defer taking action with respect to such filing, and any time periods with respect to filing or effectiveness thereof shall be tolled correspondingly, for a period of not more than ninety (90) days after the request for registration on Form S-3 referred to in Section 2.3 is given; *provided, however*, that the Company may not invoke this right more than once in any twelve (12) month period; and *provided, further*, that the Company shall not register any securities for its own account or that of any other stockholder during such ninety (90) day period other than pursuant to a Special Registration Statement.

2.4 Expenses of Registration. Except as specifically provided herein, all Registration Expenses incurred in connection with any registration, qualification or compliance pursuant to Section 2.1 or any registration under Section 2.2 or Section 2.3 herein shall be borne by the Company. All Selling Expenses incurred in connection with any registrations hereunder shall be borne by the holders of the securities so registered *pro rata* on the basis of the number of shares so registered. The Company shall not, however, be required to pay for expenses of any registration proceeding begun pursuant to Section 2.1 or 2.3, the request of which has been subsequently withdrawn by the Holders which initiated such request unless (a) the withdrawal is based upon material adverse

information concerning the Company of which such Holders were not aware at the time of such request or (b) the Holders of a majority of Registrable Securities then outstanding agree to forfeit their right to one (1) requested registration pursuant to Section 2.1 or 2.3, as applicable, in which event such right shall be forfeited by all Holders. If the Holders are required to pay the Registration Expenses, such expenses shall be borne by the holders of securities (including Registrable Securities) requesting or joining such registration in proportion to the number of shares that were to be included in such registration. If the Company is required to pay the Registration Expenses of a withdrawn offering pursuant to clause (a) above, then the Holders shall not forfeit their rights pursuant to Section 2.1 or 2.3.

2.5 Obligations of the Company. Whenever required to effect the registration of any Registrable Securities, the Company shall, as expeditiously as reasonably possible:

(a) Prepare and file with the SEC a registration statement with respect to such Registrable Securities and use best efforts to cause such registration statement to become effective, and, upon the request of the Holders of a majority of the Registrable Securities registered thereunder, keep such registration statement effective for up to one hundred twenty (120) days or, if earlier, until the Holder or Holders have completed the distribution related thereto; *provided*, *however*, that (i) such one hundred twenty (120) day period shall be extended for a period of time equal to the period the Holder refrains, at the request of an underwriter of Common Stock (or other securities) of the Company, from selling any securities included in such registration, and (ii) in the case of any registration of Registrable Securities on Form S-3 that are intended to be offered on a continuous or delayed basis, subject to compliance with applicable SEC rules, such one hundred twenty (120) day period shall be extended for up to sixty (60) days, if necessary, to keep the registration statement effective until all such Registrable Securities are sold;

(b) Prepare and file with the SEC such amendments and supplements to such registration statement and the prospectus used in connection with such registration statement as may be necessary to comply with the provisions of the Securities Act with respect to the disposition of all securities covered by such registration statement for the period set forth in subsection (a) above;

(c) Comply with Rule 172 of the Securities Act and (i) advise the selling Holders promptly of any failure by the Company to satisfy the conditions of such Rule 172 and (ii) promptly furnish to the Holders such number of copies of a prospectus, including a preliminary prospectus, in conformity with the requirements of the Securities Act, and such other documents as they may reasonably request in order to facilitate the disposition of Registrable Securities owned by them;

(d) Use best efforts to register and qualify the securities covered by such registration statement under such other securities or blue-sky laws of such jurisdictions as shall be reasonably requested by the Holders; *provided* that the Company shall not be required in connection therewith or as a condition thereto to qualify to do business or to file a general consent to service of process in any such states or jurisdictions, unless the Company is already qualified to do business or subject to service of process, as applicable, in such jurisdiction and except as may be required by the Securities Act;

(e) In the event of any underwritten public offering, enter into and perform its obligations under an underwriting agreement, in usual and customary form, with the managing underwriter(s) of such offering (each Holder participating in such underwriting shall also enter into and perform its obligations under such an agreement);

(f) Use its best efforts to cause all such Registrable Securities covered by such registration statement to be listed on a national securities exchange or trading system and each securities exchange and trading system (if any) on which similar securities issued by the Company are then listed;

(g) Provide a transfer agent and registrar for all Registrable Securities registered pursuant to this Agreement and provide a CUSIP number for all such Registrable Securities, in each case no later than the effective date of such registration;

(h) Promptly make available for inspection by the selling Holders, any managing underwriter(s) participating in any disposition pursuant to such registration statement, and any attorney or accountant or other agent retained by any such underwriter or selected by the selling Holders, all financial and other records, pertinent corporate documents, and properties of the Company, and cause the Company's officers, directors, employees, and independent accountants to supply all information reasonably requested by any such seller, underwriter, attorney, accountant, or agent, in each case, as necessary or advisable to verify the accuracy of the information in such registration statement and to conduct appropriate due diligence in connection therewith;

(i) Notify each selling Holder, promptly after the Company receives notice thereof, of the time when such registration statement has been declared effective or a supplement to any prospectus forming a part of such registration statement has been filed;

(j) After such registration statements become effective, notify each selling Holder of any request by the SEC that the Company amend or supplement such registration statement or prospectus;

(k) Promptly notify each selling Holder of any stop order issued or threatened by the SEC or any state securities commission and take all reasonable actions required to prevent the entry of such stop order or to remove it if entered;

(l) Use its best efforts to prevent the issuance of any stop order or other suspension of effectiveness and, if such order is issued, obtain the withdrawal of any such order at the earliest possible moment;

(m) Notify each Holder of Registrable Securities covered by such registration statement at any time when a prospectus relating thereto is required to be delivered under the Securities Act of the happening of any event as a result of which the prospectus included in such registration statement, as then in effect, includes an untrue statement of a material fact or omits to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances then existing, and as promptly as practicable thereafter, prepare and file with the SEC, and furnish without charge to the appropriate Holders and managing underwriter(s), if any, an amendment or supplement to such registration statement or prospectus in order to cause such registration statement or prospectus not to include any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances then existing and furnish such copies thereof as the Holders of any underwriter may reasonably request; and

(n) Use best efforts to furnish, on the date that such Registrable Securities are delivered to the underwriters for sale, if such securities are being sold through underwriters, (i) an opinion, dated as of such date, of the counsel representing the Company for the purposes of such registration, in form and substance as is customarily given to underwriters in an underwritten public offering, addressed to the underwriters, if any, and (ii) a letter, dated as of such date, from the independent certified public accountants of the Company, in form and substance as is customarily given by independent certified public accountants to underwriters in an underwritten public offering addressed to the underwriters.

2.6 Termination of Registration Rights. All registration rights granted under this Section 2 shall terminate and be of no further force and effect upon the earlier to occur of (i) three (3) years after the date of the Company's Initial Offering, or (ii) as to any Holder, at such time as such Holder could sell all of its Registrable Securities without limitation during any 90 day period under Rule 144 of the Securities Act.

2.7 Delay of Registration; Furnishing Information.

(a) No Holder shall have any right to obtain or seek an injunction restraining or otherwise delaying any such registration as the result of any controversy that might arise with respect to the interpretation or implementation of this Section 2.

(b) It shall be a condition precedent to the obligations of the Company to take any action pursuant to Section 2.1, 2.2 or 2.3 with respect to the Registrable Securities of any selling Holder that such Holder shall furnish to the Company such information regarding itself, the Registrable Securities held by it and the intended method of disposition of such securities as shall be required to effect the registration of their Registrable Securities.

(c) The Company shall have no obligation with respect to any registration requested pursuant to Section 2.1 or Section 2.3 if, due to the operation of subsection 2.1(b), the number of shares or the anticipated aggregate offering price of the Registrable Securities to be included in the registration does not equal or exceed the number of shares or the anticipated aggregate offering price required to originally trigger the Company's obligation to initiate such registration as specified in Section 2.1 or Section 2.3, whichever is applicable.

2.8 Indemnification. In the event any Registrable Securities are included in a registration statement under Section 2.1, 2.2 or 2.3:

(a) To the extent permitted by law, the Company will indemnify and hold harmless each selling Holder, the partners, members, stockholders, officers and directors of each such Holder, legal counsel and accountants of each such Holder, any underwriter (as defined in the Securities Act) for such Holder and each person, if any, who controls such Holder or underwriter within the meaning of the Securities Act or the Exchange Act, against any losses, claims, damages, or liabilities (joint or several) to which they may become subject under the Securities Act, the Exchange Act or other federal or state law, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon any of the following statements, omissions or violations (collectively a "***Violation***") by the Company: (i) any untrue statement or alleged untrue statement of a material fact contained in such registration statement or incorporated by reference therein, including any preliminary prospectus or final prospectus contained therein or any amendments or supplements thereto, (ii) the omission or alleged omission to state therein a material fact required to be stated therein, or necessary to make the statements therein not misleading, or (iii) any violation or alleged violation by the Company of the Securities Act, the Exchange Act, any state securities law or any rule or regulation promulgated under the Securities Act, the Exchange Act or any state securities law in connection with the offering covered by such registration statement; and the Company will reimburse each such Holder, partner, member, stockholder, officer, director, underwriter or controlling person, or other aforementioned person for any legal or other expenses reasonably incurred by them, as incurred, in connection with investigating or defending any such loss, claim, damage, liability or action; *provided*, *however*, that the indemnity agreement contained in this Section 2.8(a) shall not apply to amounts paid in settlement of any such loss, claim, damage, liability or action if such settlement is effected without the consent of the Company, which consent shall not be unreasonably withheld, conditioned or delayed, nor shall the Company be liable in any such case for any such loss, claim, damage, liability or action to the extent that it

arises out of or is based upon a Violation which occurs in reliance upon and in conformity with written information furnished expressly for use in connection with such registration by such Holder, partner, member, stockholder, officer, director, underwriter or controlling person, or other aforementioned person of such Holder.

(b) To the extent permitted by law, each selling Holder will, if Registrable Securities held by such Holder are included in the securities as to which such registration qualifications or compliance is being effected, severally and not jointly, indemnify and hold harmless the Company, each of its directors, each of its officers who has signed the registration statement, and each person, if any, who controls the Company within the meaning of the Securities Act, any underwriter and any other Holder selling securities under such registration statement or any of such other Holder's partners, members, stockholders, directors or officers or any person who controls such Holder, against any losses, claims, damages or liabilities (joint or several) to which the Company or any such director, officer, controlling person, underwriter or other such Holder, or partner, member, stockholder, director, officer or controlling person of such other Holder may become subject under the Securities Act, the Exchange Act or other federal or state law, insofar as such losses, claims, damages or liabilities (or actions in respect thereto) arise out of or are based upon any of the following statements: (i) any untrue statement or alleged untrue statement of a material fact contained in such registration statement or incorporated by reference therein, including any preliminary prospectus or final prospectus contained therein or any amendments or supplements thereto, (ii) the omission or alleged omission to state therein a material fact required to be stated therein, or necessary to make the statements therein not misleading, or (iii) any violation or alleged violation by the Company of the Securities Act (collectively, a "***Holder Violation***"), in each case to the extent (and only to the extent) that such Holder Violation occurs in reliance upon and in conformity with written information furnished by such Holder under an instrument duly executed by such Holder and stated to be specifically for use in connection with such registration; and each such Holder will reimburse any legal or other expenses reasonably incurred by the Company or any such director, officer, controlling person, underwriter or other Holder, or partner, member, stockholder, officer, director or controlling person of such other Holder, as incurred, in connection with investigating or defending any such loss, claim, damage, liability or action if it is judicially determined that there was such a Holder Violation; *provided*, *however*, that the indemnity agreement contained in this Section 2.8(b) shall not apply to amounts paid in settlement of any such loss, claim, damage, liability or action if such settlement is effected without the prior written consent of the Holder, which consent shall not be unreasonably withheld, conditioned or delayed; *provided further*, that in no event shall any indemnity under this Section 2.8(b) when combined with the amounts paid or payable by such Holder pursuant to Section 2.8(d), exceed the net proceeds from the offering received by such Holder.

(c) Promptly after receipt by an indemnified party under this Section 2.8 of notice of the commencement of any action (including any governmental action) for which a party may be entitled to indemnification hereunder, such indemnified party will, if a claim in respect thereof is to be made against any indemnifying party under this Section 2.8, deliver to the indemnifying party a written notice of the commencement thereof and the indemnifying party

shall have the right to participate in, and, to the extent the indemnifying party so desires, jointly with any other indemnifying party similarly noticed, to assume the defense thereof with counsel mutually satisfactory to the parties; *provided*, *however*, that an indemnified party shall have the

right to retain its own counsel, with the fees and expenses to be paid by the indemnifying party, if representation of such indemnified party by the counsel retained by the indemnifying party would be inappropriate due to actual or potential differing interests between such indemnified party and any other party represented by such counsel in such proceeding. The failure to deliver written notice to the indemnifying party within a reasonable time of the commencement of any such action, if materially prejudicial to its ability to defend such action, shall relieve such indemnifying party of any liability to the indemnified party under this Section 2.8, but the omission so to deliver written notice to the indemnifying party will not relieve it of any liability that it may have to any indemnified party otherwise than under this Section 2.8.

(d) If the indemnification provided for in this Section 2.8 is held by a court of competent jurisdiction (by the entry of a final judgment or decree by a court of competent jurisdiction and the expiration of time to appeal or the denial of the last right of appeal) to be unavailable to an indemnified party with respect to any losses, claims, damages or liabilities referred to herein, the indemnifying party, in lieu of indemnifying such indemnified party thereunder, shall to the extent permitted by applicable law contribute to the amount paid or payable by such indemnified party as a result of such loss, claim, damage or liability in such proportion as is appropriate to reflect the relative fault of the indemnifying party on the one hand and of the indemnified party on the other in connection with the Violation(s) or Holder Violation(s) that resulted in such loss, claim, damage or liability, as well as any other relevant equitable considerations. The relative fault of the indemnifying party and of the indemnified party shall be determined by a court of law by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission to state a material fact relates to information supplied by the indemnifying party or by the indemnified party and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission; *provided*, that (x) no Holder will be required to contribute any amount in excess of the public offering price of all such Registrable Securities offered and sold by such Holder pursuant to such registration statement, and (y) in no event shall any contribution by a Holder hereunder, when combined with the amounts paid or payable by such Holder pursuant to Section 2.8(b), exceed the net proceeds from the offering received by such Holder.

(e) The obligations of the Company and Holders under this Section 2.8 shall survive completion of any offering of Registrable Securities in a registration statement and the termination of this Agreement. No indemnifying party, in the defense of any such claim or litigation, shall, except with the consent of each indemnified party, consent to entry of any judgment or enter into any settlement which does not include as an unconditional term thereof the giving by the claimant or plaintiff to such indemnified party of a release from all liability in respect to such claim or litigation.

2.9 Assignment of Registration Rights. The rights to cause the Company to register Registrable Securities pursuant to this Section 2 may be assigned by a Holder to a transferee or assignee of Registrable Securities that (a) is a partner or retired partner of any Holder that is a partnership, (b) is a member or former member of any Holder that is a limited liability company, (c) is a Holder's family member or trust for the benefit of such family member or of an individual Holder, (d) is an Affiliate of such Holder, (e) is any affiliated venture capital fund of an Investor, or (f) is a transferee which acquires at least twenty-five percent (25%) of the shares of Preferred Stock held by the transferor; *provided*, *however*, (i) the transferor shall, within ten

(10) days after such transfer, furnish to the Company written notice of the name and address of such transferee or assignee and the securities with respect to which such registration rights are being assigned and (ii) such transferee shall agree to be subject to all restrictions set forth in this Agreement.

2.10 Amendment of Registration Rights. Any provision of this Section 2 may be amended and the observance thereof may be waived (either generally or in a particular instance and either retroactively or prospectively), only with the written consent of the Company and the Holders of a majority of the Registrable Securities then outstanding (including a majority of shares of the Preferred Stock then outstanding). Any amendment or waiver effected in accordance with this Section 2.10 shall be binding upon each Holder and the Company. By acceptance of any benefits under this Section 2, the Holders of Registrable Securities hereby agree to be bound by the provisions hereunder.

2.11 Limitation on Subsequent Registration Rights. Other than as provided in Section 5.10, after the date of this Agreement, the Company shall not, without the prior written consent of the Holders of a majority of the Registrable Securities then outstanding (including a majority of shares of the Preferred Stock then outstanding), enter into any agreement with any holder or prospective holder of any securities of the Company that would grant such holder registration rights senior to those granted to the Holders hereunder, other than the right to a Special Registration Statement.

2.12 *"Market Stand-Off"* Agreement. Each Holder hereby agrees that such Holder shall not sell, transfer, make any short sale of, grant any option for the purchase of, or enter into any hedging or similar transaction with the same economic effect as a sale with respect to, any Common Stock (or other securities) of the Company held by such Holder (other than those included in the registration) for a period specified by the representative of the underwriters of Common Stock (or other securities) of the Company not to exceed one hundred eighty (180) days following the effective date of a registration statement of the Company filed under the Securities Act; *provided* that:

(a) such agreement shall apply only to the Company's Initial Offering; and

(b) all officers and directors of the Company and holders of at least one percent (1%) of the Company's voting securities are subject to the same restrictions.

2.13 Agreement to Furnish Information. Each Holder agrees to execute and deliver such other agreements as may be reasonably requested by the Company or the underwriter that are consistent with the Holder's obligations under Section 2.12 or that are necessary to give further effect thereto. In addition, if requested by the Company or the representative of the underwriters of Common Stock (or other securities) of the Company, each Holder shall provide, within ten (10) days of such request, such information as may be required by the Company or such representative in connection with the completion of any public offering of the Company's securities pursuant to a registration statement filed under the Securities Act. The obligations described in Section 2.12 and this Section 2.13 shall not apply to a Special Registration Statement. The Company may impose stop-transfer instructions with respect to the shares of Common Stock (or other securities) subject to the foregoing restriction until the end of said one

hundred eighty (180) day period. Each Holder agrees that any transferee of any shares of Registrable Securities shall be bound by Sections 2.12 and 2.13. The underwriters of the Company's stock are intended third party beneficiaries of Sections 2.12 and 2.13 and shall have the right, power and authority to enforce the provisions hereof as though they were a party hereto.

2.14 Rule 144 Reporting. With a view to making available to the Holders the benefits of certain rules and regulations of the SEC which may permit the sale of the Registrable Securities to the public without registration, the Company shall:

(a) Make and keep public information available, as those terms are understood and defined in SEC Rule 144 or any similar or analogous rule promulgated under the Securities Act, at all times after the effective date of the first registration filed by the Company for an offering of its securities to the general public;

(b) File with the SEC, in a timely manner, all reports and other documents required of the Company under the Exchange Act; and

(c) So long as a Holder owns any Registrable Securities, furnish to such Holder forthwith upon request: (i) a written statement by the Company as to its compliance with the reporting requirements of said Rule 144 of the Securities Act, and of the Exchange Act (at any time after it has become subject to such reporting requirements), or its qualification as a registrant whose securities may be resold pursuant to Form S-3 (at any time after the Company so qualifies); (ii) a copy of the most recent annual or quarterly report and such other periodic reports of the Company filed with the Commission; and (iii) such other reports and documents as a Holder may reasonably request in connection with availing itself of any rule or regulation of the SEC allowing it to sell any such securities without registration or pursuant to such Form S-3.

SECTION 3. COVENANTS OF THE COMPANY.

3.1 Basic Financial Information and Reporting.

(a) The Company shall maintain true books and records of account in which full and correct entries will be made of all its business transactions pursuant to a system of accounting established and administered in accordance with GAAP consistently applied, and will set aside on its books all such proper accruals and reserves as shall be required under GAAP consistently applied.

(b) So long as an Investor (with its Affiliates) shall own not less than 250,000 shares (as adjusted for any stock dividends, splits, combinations, recapitalizations and the like) of Registrable Securities (each, a "***Significant Holder***"), as soon as practicable and in any event within one hundred twenty (120) days after the end of each fiscal year of the Company, the Company shall furnish each Significant Holder (i) an audited consolidated balance sheet of the Company, as at the end of such fiscal year, and audited consolidated statements of income and cash flows of the Company, for such year, all prepared in accordance with GAAP consistently applied and setting forth in each case in comparative form the figures for the previous fiscal year and as included in the Budget (as defined below) for such year, with an

explanation of any material differences between such figures, all in reasonable detail, and (ii) a statement of stockholders' equity as of the end of such year. Such financial statements shall be accompanied by a report and opinion thereon by independent public accountants of national standing selected by the Board, including a majority of the Preferred Directors.

(c) The Company shall furnish each Significant Holder, as soon as practicable and in any event within forty-five (45) days after the end of each of the first three (3) fiscal quarters of the Company, (i) an unaudited consolidated balance sheet of the Company as of the end of such fiscal quarter and unaudited consolidated statements of income and cash flows of the Company for such fiscal quarter, all prepared in accordance with GAAP consistently applied (except that such financial statements may (x) be subject to normal year-end audit adjustments and (y) not contain all notes thereto that may be required in accordance with GAAP), and (ii) a statement of stockholders' equity as of the end of such fiscal quarter.

(d) The Company shall furnish each Significant Holder, as soon as practicable and in any event within thirty (30) days after the end of each month, (i) an unaudited consolidated balance sheet of the Company as of the end of each month, and unaudited consolidated statements of income and cash flows of the Company, together with supporting schedules, for such month and for the current fiscal year to date, prepared in accordance with GAAP consistently applied setting forth in comparative form (x) the Company's projected financial statements for the current fiscal year to date as included in the Budget and (y) the Company's financial statements for the corresponding periods for the immediately preceding fiscal year, and (ii) a statement of stockholders' equity as of the end of such month.

(e) The Company will furnish each Significant Holder: (i) at least thirty (30) days prior to the beginning of each fiscal year a detailed annual and monthly budget, projected annual and monthly financial statements, and operating plans for such fiscal year, together with a written discussion of the operating plan (the "***Budget***"), and as soon as available, any subsequent written revisions thereto; (ii) within ten (10) days of delivery, such other notices, information and data with respect to the Company as the Company delivers to the holders of Common Stock; and (iii) promptly, such other information and data as such Significant Holder may from time to time reasonably request.

(f) On and after the date on which the Company becomes subject to the requirements under either Section 13 or 15(d) of the Exchange Act, the Company may send to each Significant Holder the reports, including the financial statements contained therein, that are required to be filed with the Commission under the Exchange Act in lieu of the financial information and certificates required to be delivered under this Section 3.1.

3.2 Inspection Rights. Each Significant Holder shall have the right to visit and inspect any of the properties of the Company or any of its subsidiaries, and to discuss the affairs, finances and accounts of the Company or any of its subsidiaries with its officers, and to review such information as is reasonably requested all at such reasonable times and as often as may be reasonably requested; *provided*, *however*, that the Company shall not be obligated under this Section 3.2 with respect to a competitor of the Company or with respect to information which the Board determines in good faith is confidential or attorney-client privileged and should not, therefore, be disclosed. Notwithstanding anything to the contrary contained in this Agreement,

in the event that Pfizer is deemed to be a competitor of the Company, the investment, legal, finance, tax, accounting and audit personnel of Pfizer and its Affiliates may exercise the rights set forth in this Section 3.2 solely for the purpose of managing, evaluating and reporting on Pfizer's investment in the Company.

3.3 Confidentiality of Records. Each Investor agrees that it shall keep confidential and shall not disclose or divulge any confidential, proprietary, or secret information which such Investor may obtain from the Company pursuant to the financial statements, reports, and other materials submitted by the Company to such Investor pursuant to this Agreement or otherwise, or pursuant to visitation or inspection rights granted under this Agreement, unless (a) such information enters the public domain through no fault of such Investor, (b) such information is communicated to such Investor by a third party without breach of any obligation of confidentiality such third party may have to the Company, (c) the Company provides written consent to the disclosure of such information, (d) such information is developed by Investor or its agents independently of and without reference to any confidential information communicated by the Company, or (e) required by a valid order of a court or governmental body having jurisdiction or otherwise required by law, statutes, rules or regulations or pursuant to any direction, request or requirement (whether or not having the force of law but if not having the force of law being of a type with which institutional or corporate investors in the relevant jurisdiction are accustomed to comply) of any self-regulating organization or any governmental, fiscal, monetary or other authority; provided, however, that an Investor may disclose such information (A) to its partners, subsidiaries, parents, officers, employees, agents, directors, Affiliates, attorneys, accountants, consultants, and other professionals for the purpose of evaluating its investment in the Company as long as such attorneys, advisors, accountants, partners, subsidiaries, parents, officers, employees, agents, directors or Affiliates are advised of the confidentiality provisions of this Section 3.3, (B) to any prospective purchaser of any Shares from such Investor as long as such prospective purchaser agrees in writing to be bound by the provisions of this Section 3.3, (C) for internal market, industry and investment analyses, or (D) to any Affiliate of such Investor or to a partner or stockholder of such Purchaser; and provided, further, that if any Investor is required or requested to disclose information pursuant to (e) above, such Investor shall use its commercially reasonable efforts to limit such disclosure and to obtain confidential treatment or a protective order for such information and shall give the Company prompt written notice prior to such disclosure to the extent practicable. The Company acknowledges that certain of the Investors are in the business of venture capital or private equity investing and therefore review the business plans and related proprietary information of many enterprises, including enterprises that may have products or services that compete directly or indirectly with those of the Company. Nothing in this Agreement shall preclude or in any way restrict the Investors from investing or participating in any particular enterprise, regardless of whether such enterprise has products or services that compete with those of the Company. The Company and each Investor acknowledges and agrees that certain of the Investors or their Affiliates may presently have, or may engage in the future in, internal development programs, or may receive information from third parties that relates to, and may develop and commercialize products independently or in cooperation with such third parties, that are similar to or that are directly or indirectly competitive with the Company's development programs, products or services. Nothing in this Agreement or any other agreement related to the transactions contemplated by this Agreement shall in any way preclude or restrict such Investors or their Affiliates from conducting any development program, commercializing any product or service or

otherwise engaging in any enterprise, whether or not such development program, product, service or enterprise competes with those of the Company, so long as such activities do not result in a violation of the confidentiality provisions of this Agreement.

3.4 Reservation of Common Stock. The Company will at all times reserve and keep available, solely for issuance and delivery upon the conversion of the Preferred Stock, all Common Stock issuable from time to time upon such conversion.

3.5 Proprietary Information and Inventions Agreement. The Company shall require all employees, advisors and consultants of the Company or any of its subsidiaries to execute and deliver a Proprietary Information and Inventions Agreement substantially in a form approved by the Board.

3.6 Employee Vesting. Unless otherwise approved by the Board, including a majority of the Preferred Directors, all future employees, advisors and consultants of the Company who purchase, receive options to purchase, or receive awards of shares of the Company's capital stock after the date hereof shall be required to execute restricted stock or option agreements, as applicable, providing for (i) vesting of shares over a four (4) year period, with the first twenty-five percent (25%) of such shares vesting following twelve (12) months of continued employment or service, and the remaining shares vesting in equal monthly installments over the following thirty-six (36) months, and (ii) a one hundred eighty (180) day lockup period in connection with the Initial Offering. Notwithstanding the foregoing, solely with respect to any equity award or option grant by the Company immediately following the Initial Closing to any employee, advisor or consultant who has been employed with or providing services to the Company for at least one year before the Initial Closing, such equity award or option grant shall not be subject to a one-year cliff. The Company shall, upon termination of employment of a holder of restricted stock for any reason, have the right to repurchase unvested shares at the lower of cost or the fair market value of such shares at the time of repurchase.

3.7 Matters Requiring Preferred Directors' Approval. The Company shall not, without approval of the Board, which approval must include the affirmative vote of a majority of the Preferred Directors or if there is only one Preferred Director, the affirmative vote of such remaining Preferred Director:

(a) incur indebtedness in excess of $100,000, individually or in the aggregate, other than payables incurred in the ordinary course of business;

(b) change the principal business of the Company, enter into any material new line of business, or exit the current line of business;

(c) enter into or be a party to any transaction with or modify any agreement with any director, officer, or employee of the Company or any "associate" (as defined in Rule 12b-2 promulgated under the Exchange Act) of any such Person, except for transactions contemplated by this Agreement or customary compensation or benefit arrangements that are approved by the Board; or

(d) amend the Company's 2008 Long Term Incentive Plan, as amended, or approve any new equity incentive plan.

3.8 Directors' Liability and Indemnification. The Restated Certificate and the Company's Bylaws, as amended from time to time (the "***Bylaws***"), shall provide (a) for elimination of the liability of directors to the maximum extent permitted by law and (b) for indemnification of directors for acts on behalf of the Company to the maximum extent permitted by law.

3.9 Insurance. The Company shall obtain, as soon as possible after the date hereof, from a financially sound and reputable insurer, directors and officers liability insurance to the maximum extent permitted by law and providing for at least $5,000,000 in coverage, and shall cause such insurance policy to be maintained until such time as the Board, including a majority of the Preferred Directors, determines that such insurance should be discontinued. The Company shall use commercially reasonable efforts to obtain, as soon as possible after the date hereof, from a financially sound and reputable insurer, term "key-person" life insurance on the Company's chief executive officer, in the aggregate amount of $1,000,000, and shall cause such insurance policy to be maintained until such time

as the Board, including a majority of the Preferred Directors, determines that such insurance should be discontinued. The key-person policy shall name the Company as loss payee, and neither policy shall be cancelable by the Company without prior approval of the Board, including a majority of the Preferred Directors.

3.10 Successor Indemnification. If the Company or any of its successors or assignees (i) consolidates with or merges into any other person and is not the continuing or surviving corporation or entity of such consolidation or merger or (ii) transfers or conveys all or substantially all of its properties and assets to any person, then, and in each such case, to the extent reasonably necessary, the Company will use commercially reasonable efforts for proper provision to be made so that the successors and assignees of the Company assume the obligations of the Company with respect to indemnification of members of the Board as in effect immediately before such transaction, whether such obligations are contained in the Bylaws, the Restated Certificate or elsewhere, as the case may be.

3.11 Compensation Committee. The Board will maintain a compensation committee to recommend management compensation and the Company's benefit plans for approval by the Board and to administer the Company's equity incentive plans. The compensation committee shall contain no more than three (3) persons, including the Preferred Directors designated by Sofinnova and NEA, respectively, pursuant to that certain Second Amended and Restated Voting Agreement dated as of the date hereof, by and among the Company, the Investors and certain other parties set forth therein (the "***Voting Agreement***").

3.12 Audit Committee. The Board will maintain an audit committee. The audit committee shall contain no more than three (3) persons, including the Preferred Director designated by Sofinnova pursuant to the Voting Agreement.

3.13 Meeting of the Board; Board Expenses; Compensation of Directors. The Board shall meet at least five (5) times each year in accordance with an agreed-upon schedule. The Company shall reimburse each non-employee director for (i) all reasonable expenses

incurred for services on the Board and (ii) out-of-pocket travel expenses incurred in connection with travel to and from the meetings of the Board. If any non-employee director receives equity compensation for his or her services as a director of the Company, each other non-employee director shall be entitled to receive the same equity compensation; *provided*, *however*, that each such non-employee director shall have the right in his or her discretion to waive receiving such equity compensation.

3.14 Qualifying Investments. Any future purchases of Company securities by Sofinnova in connection with or upon a registered public offering of the Company shall constitute a qualifying investment, as such term is defined in Rule 203(1)-1 promulgated under the Investment Advisers Act of 1940, as amended.

3.15 Small Business Stock; Real Property Holding Corporation.

(a) For so long as any of the shares of Preferred Stock are held by an Investor (or a transferee in whose hands such shares are eligible to qualify as "Qualified Small Business Stock" as defined in Section 1202(c) of the Internal Revenue Code of 1986, as amended (the "***Code***")), the Company will use its reasonable efforts to comply with the reporting and recordkeeping requirements of Section 1202 of the Code, any regulations promulgated thereunder and any similar state laws and regulations. The Company agrees to submit to any Investor and to the Internal Revenue Service, if necessary, any reports that may be required under Section 1202(d)(1)(c) of the Code and any related Treasury Regulations. In addition, within ten (10) days after any Investor has delivered to the Company a written request therefor, the Company shall deliver to such Investor a written statement indicating whether Preferred Stock constitutes "Qualified Small Business Stock" as defined in Section 1202(c) of the Code. The Company's obligation to furnish a written statement pursuant to this Section 3.15(a) shall continue notwithstanding the fact that a class of the Company's stock may be traded on an established securities market.

(b) The Company shall provide prompt notice to each Investor following any "determination date" (as defined in Treasury Regulation Section 1.897-2(c)(1)) on which the Company becomes a United States real property holding corporation. In addition, upon a written request by any Investor, the Company shall provide such Investor with a written statement informing such Investor whether such Investor's interest in the Company constitutes a United States real property interest. The Company's determination shall comply with the requirements of Treasury Regulation Section 1.897-2(h)(1) or any successor regulation, and the Company shall provide timely notice to the Internal Revenue Service, in accordance with and to the extent required by Treasury Regulation Section 1.897-2(h)(2) or any successor regulation, that such statement has been made. The Company's written statement shall be delivered to such Investor within ten (10) days of such Investor's written request therefor. The Company's obligation to furnish such written statement pursuant to this Section 3.15(b) shall continue notwithstanding the fact that a class of the Company's stock may be regularly traded on an established securities market or the fact that there is no preferred stock then outstanding.

3.16 Certain Covenants Relating to SBA Matters.

(a) Compliance. So long as any Investor which is a licensed Small Business Investment Company (an "***SBIC Investor***") holds any securities of the Company, the Company will at all times comply with the non-discrimination requirements of 13 C.F.R. Parts 112, 113 and 117.

(b) Information for SBIC Investor. Within forty-five (45) days after the end of each fiscal year and at such other times as an SBIC Investor may reasonably request, the Company shall deliver to such SBIC Investor a written assessment, in form and substance satisfactory to such SBIC Investor, of the economic impact of such SBIC Investor's financing specifying the full-time equivalent jobs created or retained in connection with such investment, and the impact of the financing on the Company's business in terms of profits and on taxes paid by the Company and its employees. Upon request, the Company agrees to promptly provide each SBIC Investor with sufficient information to permit such Investor to comply with their obligations under the Small Business Investment Act of 1958, as amended, and the regulations promulgated thereunder and related thereto; *provided*, *however*, each SBIC Investor agrees that it will protect any information which the Company labels as confidential to the extent permitted by law. Any submission of any financial information under this Section shall include a certificate of the Company's president, chief executive officer, treasurer or chief financial officer.

3.17 Series C Preferred Stock Dividend. In connection with the Special Dividend (as defined in the Restated Charter), each holder of Series A Preferred Stock and Series B Preferred Stock hereby represents and warrants to the Company and further agrees as follows: (a) such stockholder has been advised in writing to consult with such attorneys, accountants and other advisors of his, her or its own choice with respect to the Special Dividend; (b) such stockholder has had the opportunity and sufficient time to seek such legal, accounting and other advice; and (c) such stockholder solely shall be responsible for any taxes due by such stockholder as a result of the Special Dividend. Each holder of Series A Preferred Stock and Series B Preferred Stock will defend and indemnify the

Company from and against: (i) any tax liability actually incurred by the Company that results directly from the failure of such stockholder to pay any taxes due by such stockholder as a result of the Special Dividend and (ii) any and all losses or liabilities, including defense costs, actually incurred by the Company that result directly from such stockholder's failure to pay any taxes due as a result of the Special Dividend.

3.18 Board Matters. Each Preferred Director shall be entitled in such person's discretion to be a member of any committee of the Board of Directors of the Company, unless such committee is comprised solely of disinterested directors and such Preferred Director is not disinterested for such purposes. If at any time the Company has any subsidiaries, then the board of directors of any subsidiary of the Company shall be comprised of the same members as the Board of Directors of the Company.

3.19 FCPA Compliance. The Company shall not, and shall not permit any of its subsidiaries and Affiliates or any of its or their respective directors, officers, managers, employees, independent contractors, representatives or agents (collectively, "***Representatives***") to, promise, authorize or make any payment to, or otherwise contribute any item of value to, directly or indirectly, any non-U.S. government official, in each case, in violation of the U.S. Foreign Corrupt Practices Act ("***FCPA***") or any other applicable anti-bribery or anti-corruption

law. The Company shall, and shall cause each of its subsidiaries and Affiliates to, cease all of its or their respective activities, as well as remediate any actions taken by the Company, its subsidiaries or Affiliates or any of its or their respective Representatives in violation of the FCPA or any other applicable anti-bribery or anti-corruption law. The Company shall, and shall cause each of its Affiliates and subsidiaries to, maintain systems or internal controls (including, but not limited to, accounting systems, purchasing systems and billing systems) to ensure compliance with the FCPA or any other applicable anti-bribery or anti-corruption law.

3.20 Termination of Covenants. All covenants of the Company contained in Section 3 of this Agreement (other than the provisions of Sections 3.3, 3.8, 3.10, 3.14, 3.15, 3.17, and 3.19) shall terminate and be of no further force or effect as to each Investor (a) immediately prior to the consummation of the Qualified IPO (as defined in the Restated Certificate) or (b) when the Company first becomes subject to the periodic reporting requirements of Section 12(g) or 15(d) of the Exchange Act, whichever event occurs first.

SECTION 4. RIGHTS OF FIRST REFUSAL.

4.1 Subsequent Offerings. Subject to applicable securities laws, each Investor holding at least 1,900,000 shares (as adjusted for any stock dividends, splits, combinations, recapitalizations and the like) of Series A Preferred Stock, Series B Preferred Stock, Series B-1 Preferred Stock and Series C Preferred Stock (each, a "***Major Holder***") shall have a right of first refusal to purchase all or any portion of its *pro rata* share of all Equity Securities, as defined below, that the Company may, from time to time, propose to sell and issue after the date of this Agreement, other than the Equity Securities excluded by Section 4.6 hereof. Each Major Holder's *pro rata* share is equal to the ratio of (x) the number of shares of the Common Stock (including all shares of Common Stock issuable or issued upon conversion of the Shares) held by such Major Holder immediately prior to the issuance of such Equity Securities to (y) the total number of shares of Common Stock (including all shares of Common Stock issued or issuable upon conversion of the Shares or upon the exercise of any outstanding warrants or options) outstanding immediately prior to the issuance of the Equity Securities. The term "***Equity Securities***" shall mean (a) any Common Stock, Preferred Stock or other security of the Company, (b) any security or right convertible into or exercisable or exchangeable for, with or without consideration, any Common Stock, Preferred Stock or other security (including any option to purchase such a convertible security), (c) any security carrying any warrant or right to subscribe to or purchase any Common Stock, Preferred Stock or other security or (d) any such warrant or right.

4.2 Exercise of Rights. If the Company proposes to issue any Equity Securities, it shall give each Major Holder written notice (the "***Offer Notice***") of its intention, describing the Equity Securities, the price and the terms and conditions upon which the Company proposes to issue the same. Each Major Holder shall have forty-five (45) days after receipt of the Offer Notice to elect to purchase its *pro rata* share of the Equity Securities for the price and upon the terms and conditions specified in the Offer Notice by giving written notice to the Company and stating therein the quantity of Equity Securities to be purchased. If not all of the Major Holders elect to purchase their *pro rata* share of the Equity Securities, then the Company shall promptly notify in writing (the "***Overallotment Notice***") the Major Holders who elect to purchase their full pro rata share of the Equity Securities (each a "***Fully-Exercising Holder***") of any other Major

Holder's failure to do likewise and shall offer such Fully-Exercising Holder(s) the right to acquire such unsubscribed shares that the Major Holders were entitled to subscribe for but that were not subscribed for by the Major Holders (the "***Overallotment Shares***"). Each Fully-Exercising Holder shall have ten (10) days after receipt of the Overallotment Notice to notify the Company of its election to purchase up to such portion of the Overallotment Shares as is equal to the ratio of (x) the number of shares of the Common Stock (including all shares of Common Stock issuable or issued upon conversion of the Shares) held by such Fully-Exercising Holder immediately prior to the issuance of such Equity Securities to (y) the total number of shares of Common Stock (including all shares of Common Stock issued or issuable upon conversion of the Shares or upon the exercise of any outstanding warrants or options) held by all Fully-Exercising Holders immediately prior to the issuance of the Equity Securities. The closing of any sale pursuant to this Section 4.2 shall occur within sixty (60) days after the date that the Offer Notice is received by the Major Holders.

4.3 Issuance of Equity Securities to Other Persons. To the extent that the Major Holders fail to exercise in full the rights of first refusal pursuant to Section 4.2 with respect to the Equity Securities being offered by the Company, the Company shall have thirty (30) days after the expiration of the of the periods provided in Section 4.2 to sell the Equity Securities in respect of which the Major Holders' rights were not exercised, at a price and upon general terms and conditions no more favorable to the purchasers thereof than specified in the Offer Notice pursuant to Section 4.2 hereof. If the Company has not sold such Equity Securities within such thirty (30) day period, the Company shall not thereafter issue or sell any Equity Securities without first offering such securities to the Major Holders in the manner provided above.

4.4 Termination and Waiver of Rights of First Refusal. The rights of first refusal set forth in this Section 4 shall not apply to, and shall terminate immediately prior to the Qualified IPO. The rights of first refusal established by this Section 4 may be amended, or any provision waived with the written consent of the Required Holders pursuant to Section 5.5.

4.5 Transfer of Rights of First Refusal. The rights of first refusal of each Holder under this Section 4 may be transferred to the same parties as set forth in Section 2.9, subject to the same restrictions as any transfer of registration rights pursuant to Section 2.9.

4.6 Excluded Securities. The rights of first refusal set forth in this Section 4 shall have no application to the Exempted Securities (as defined in the Restated Certificate).

SECTION 5. MISCELLANEOUS.

5.1 Governing Law; Jurisdiction. This Agreement shall be governed by and construed under the laws of the State of Delaware in all respects as such laws are applied to agreements among Delaware residents entered into and performed entirely within Delaware. The parties agree that any action brought by any party under or in relation to this Agreement, including, without limitation, to interpret or enforce any provision of this Agreement, may be brought in, and each party agrees to and does hereby submit to the jurisdiction and venue of the state courts of the State of California and the State of Texas and to the jurisdiction of the United States District Court for the Northern District of California and the United States District Court for the Western District of Texas—Austin Division. Each party hereby waives, and agrees not to

assert, by way of motion, as a defense, or otherwise, in any such suit, action or proceeding, any claim that it is not subject personally to the jurisdiction of the above-named courts, that its property is exempt or immune from attachment or execution, that the suit, action or proceeding is brought in an inconvenient forum, that the venue of the suit, action or proceeding is improper or that this Agreement or the subject matter hereof may not be enforced in or by such court.

5.2 Successors and Assigns. Except as otherwise expressly provided herein, the provisions hereof shall inure to the benefit of, and be binding upon, the parties hereto and their respective successors, assigns, heirs, executors, and administrators and shall inure to the benefit of and be enforceable by each person who shall be a holder of Registrable Securities from time to time; *provided*, *however*, that any attempted Transfer of the rights of a Holder or Investor pursuant to this Agreement or pursuant to the Right of First Refusal Agreement that does not comply with the applicable provisions of the Right of First Refusal Agreement and Sections 2.9 and 4.5 of this Agreement and shall be void *ab initio* and shall not confer any rights on the purported transferee or assignee, and the Company may deem and treat the person listed as the holder of such shares in its records as the absolute owner and holder of such shares for all purposes, including the payment of dividends or any redemption price and voting or exercising the rights of a Holder or Investor pursuant to this Agreement or the Right of First Refusal Agreement. The rights of any Investor under this Agreement may be assigned, in whole or in part, to any Affiliate of such Investor in connection with a transfer of the related Registrable Securities by such Investor to such Affiliate.

5.3 Entire Agreement. This Agreement and the Exhibits and Schedules hereto constitute the full and entire understanding and agreement between the parties with regard to the subjects hereof and no party shall be liable or bound to any other in any manner by any oral or written representations, warranties, covenants and agreements except as specifically set forth herein. Each party expressly represents and warrants that it is not relying on any oral or written representations, warranties, covenants or agreements outside of this Agreement.

5.4 Severability. In the event one or more of the provisions of this Agreement should, for any reason, be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provisions of this Agreement, and this Agreement shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

5.5 Amendment and Waiver.

(a) Except as otherwise expressly provided herein, this Agreement may be amended, modified or terminated and observance of any provision of this Agreement may be waived (either generally or in a particular instance and either retroactively or prospectively) only with the written consent of the Company and the Required Holders. Notwithstanding the foregoing, this Agreement may not be amended, modified or terminated and the observance of any term hereof may not be waived with respect to any Investor without the written consent of such Investor if such amendment, modification, termination or waiver materially and adversely affects such Investor in a different manner than the other Investors (it being agreed that a waiver of the provisions of Section 4 with respect to a transaction shall not be deemed to materially and adversely affect any Major Holder in a different manner than the other Major Holders if such

Major Holder will not be able to purchase all or any portion of its *pro rata* share of Equity Securities if such waiver does so by its terms, notwithstanding the fact that certain Major Holders may nonetheless by agreement with the Company, purchase Equity Securities in such transaction). Any amendment, modification, termination or waiver effected in accordance with this Section 5.5 shall be binding upon the Company, each of the other parties hereto and any successor or permitted assignee of any such party whether or not such party, successor or assignee entered into or approved such amendment, modification or waiver.

(b) For the purposes of determining the number of Holders or Investors entitled to vote or exercise any rights hereunder, the Company shall be entitled to rely solely on the list of record holders of its stock as maintained by or on behalf of the Company.

5.6 Delays or Omissions. It is agreed that no delay or omission to exercise any right, power, or remedy accruing to any party, upon any breach, default or noncompliance by another party under this Agreement shall impair any such right, power, or remedy, nor shall it be construed to be a waiver of any such breach, default or noncompliance, or any acquiescence therein, or of any similar breach, default or noncompliance thereafter occurring. It is further agreed that any waiver, permit, consent, or approval of any kind or character on any party's part of any breach, default or noncompliance under this Agreement or any waiver on such party's part of any provisions or conditions of this Agreement must be in writing and shall be effective only to the extent specifically set forth in such writing. All remedies, either under this Agreement, by law, or otherwise afforded to any party, shall be cumulative and not alternative.

5.7 Notices. All notices required or permitted hereunder shall be in writing and shall be deemed effectively given: (a) upon personal delivery to the party to be notified, (b) when sent by confirmed electronic mail or facsimile if sent during normal business hours of the recipient; if not, then on the next business day, (c) five (5) days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (d) one (1) day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt. All communications shall be sent (x) to the Company at the address as set forth on the signature page hereof, with a copy to Vinson & Elkins L.L.P., Terrace 7, 2801 Via Fortuna, Suite 100, Austin, Texas 78746, Attention: William R. Volk, (512) 236-3450 (fax), and (y) to any other party to be notified at the address as set forth on the signature pages hereof or **Exhibit A** hereto (and in the case of notice to Sofinnova, with a copy, which shall not constitute notice, to O'Melveny & Myers LLP, 2765 Sand Hill Road, Menlo Park, CA 94025, Attention: Brian Covotta, (650) 473-2601 (fax)) or at such other address or electronic mail address as such party may designate by ten (10) days advance written notice to the other parties hereto.

5.8 Attorneys' Fees. In the event that any suit or action is instituted under or in relation to this Agreement, including, without limitation, to enforce any provision in this Agreement, the prevailing party in such dispute shall be entitled to recover from the losing party all fees, costs and expenses of enforcing any

right of such prevailing party under or with respect to this Agreement, including, without limitation, such reasonable fees and expenses of attorneys and accountants, which shall include, without limitation, all fees, costs and expenses of appeals.

5.9 Titles and Subtitles. The titles of the sections and subsections of this Agreement are for convenience of reference only and are not to be considered in construing this Agreement.

5.10 Additional Investors. Notwithstanding anything to the contrary contained herein, if the Company shall issue additional shares of Preferred Stock after the date hereof, any purchaser of such shares of Preferred Stock may become a party to this Agreement by executing and delivering an additional counterpart signature page to this Agreement and shall be deemed an "Investor," a "Holder" and a party hereunder. Notwithstanding anything to the contrary contained herein, each stockholder of Asuragen, Inc., a Delaware corporation ("***Asuragen***"), who received Registrable Securities in connection with the distribution by Asuragen of the Equity Securities held by Asuragen on December 31, 2009 automatically, and without any further action on the part of the Company, Asuragen, such stockholder or any other person, became a party to this Agreement and shall be deemed an "Investor," a "Holder" and a party hereunder, and shall be bound by this Agreement to the same extent as if such stockholder had joined in the execution and delivery of this Agreement.

5.11 Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be an original, but all of which together shall constitute one instrument.

5.12 Aggregation of Stock. All shares of Preferred Stock or Registrable Securities held or acquired by affiliated entities or persons or persons or entities under common management or control shall be aggregated together for the purpose of determining the availability of any rights under this Agreement.

5.13 Pronouns. All pronouns contained herein, and any variations thereof, shall be deemed to refer to the masculine, feminine or neutral, singular or plural, as to the identity of the parties hereto may require.

5.14 Prior Agreement. The Company and the Investors party to the Prior Agreement (which parties hold the requisite percentages to amend the Prior Agreement by written consent) hereby amend and restate the Prior Agreement in its entirety and the Prior Agreement shall automatically terminate and be no further force or effect.

[THIS SPACE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

COMPANY:

MIRNA THERAPEUTICS, INC.

By: /s/ Lynn Hohlfeld
Name: Lynn Hohlfeld
Title: Chief Financial Officer

Address: 2150 Woodward Street, Suite 100
Austin, Texas 78744

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

SOFINNOVA VENTURE PARTNERS VIII, L.P.

By: Sofinnova Management VIII, L.L.C.,
its General Partner

By: /s/ Michael F. Powell
Name: Michael F. Powell
Title: Managing Member

Address: 2800 Sand Hill Road, Suite 150
Menlo Park, CA 94025

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTORS:

NEW ENTERPRISE ASSOCIATES 14, L.P.

By: NEA Partners 14, L.P., its general partner
By: NEA 14 GP, LTD, its general partner

By: /s/ Louis S. Citron
Name: Louis S. Citron
Title: Chief Legal officer

Address: 1954 Greenspring Drive., Suite 600
Timonium, MD 21093

NEA VENTURES 2012, LIMITED PARTNERSHIP

By: /s/ Louis S. Citron
Name: Louis S. Citron
Title: Vice President

Address: 1954 Greenspring Drive., Suite 600
Timonium, MD 21093

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

PFIZER INC.

By: /s/ Barbara Dalton
Name: Barbara Dalton
Title: VP Venture Capital
Worldwide Business Development

Address: 235 East 42nd Street
New York, NY 10017

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

OSAGE UNIVERSITY PARTNERSHIP I, L.P.

By: Osage University GP, LP, its general partner
By: Osage Partners, LLC, general partner

By: /s/ William Harrington
Name: William Harrington
Title: Member

Address: Osage Management Co., L.P.
50 Monument Road
Suite 201
Bala Cynwyd, PA 19004

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

CORRELATION VENTURES, L.P.
As nominee for Correlation Ventures L.P.,
Correlation Ventures Executives Fund, L.P.

By: Carrel — Ventures GP, LLC

By: /s/ David E. Coats
Name: David E. Coats
Title: Managing Member

Address: 9255 Towne Center Drive, Suite 350
San Diego, CA 92121

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof,

INVESTOR:

/s/ Matthew Winkler
Matthew Winkler

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

/s/ Neile P Wolfe
Neile P. Wolfe

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

DANIEL WINKLER 2000 TRUST

By: /s/ Mary Beth Bigger
Name Mary Beth Bigger
Title: Trustee

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

JOHN WINKLER 2000 TRUST

By: /s/ Mary Beth Bigger
Name: Mary Beth Bigger
Title: Trustee

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

JOSHUA WINKLER 2000 TRUST

By: /s/ Mary Beth Bigger
Name: Mary Beth Bigger
Title: Trustee

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

/s/ Roland Carlson
Roland Carlson

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

/s/ John E. Mooney
John E. Mooney

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

/s/ Robert E. Maxson, Jr.
Robert E. Maxson, Jr

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

/s/ William Bennett
William Bennett

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

/s/ John D. Hershey
John D. Hershey

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the that paragraph hereof

INVESTOR:

/s/ David W. Sargent
David W. Sargent

Address: [Address]

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

THE STATE OF TEXAS

By: /s/ Jeffrey S. Boyd
Name: Jeffrey S. Boyd
Title: Chief of Staff, Office of the Governor

Address: Financial Services
ETF Compliance
PO Box 12878
Austin, TX 78711-2878

with a concurrent copy to:

ATTN: Emerging Technology Fund
Award Program
General Counsel
Office of the Governor
P.O. Box 12428
Austin, Texas 78711

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

PTV SCIENCES II, L.P.

By: Pinto Technology Ventures GP, L.P.,
its general partner

By: Pinto TV GP Company LLC,
its general partner

By: /s/ Evans S. Melrose, M.D.
Name: Evan S. Melrose, M.D.
Title: Authorized Person

Address:

IN WITNESS WHEREOF, the parties hereto have executed this **SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

/s/ Christopher Earl
Christopher Earl

Address: [Address]

EXHIBIT A

SCHEDULE OF INVESTORS

Series C Investors

Sofinnova Venture Partners VIII, L.P.
New Enterprise Associates 14, L.P.
NEA Ventures 2012, Limited Partnership
Pfizer Inc.
Osage University Partners I, L.P.
Correlation Ventures, L.P.
Bennett, William
Carlson, Rolland
Hershey, John D.
Maxson Jr., Robert E.
Mooney, John E.
Sargent, David W.
Winkler, Matthew
Wolfe, Neile P.
Daniel Winkler 2000 Trust
John Winkler 2000 Trust
Joshua Winkler 2000 Trust

Series B-1 Investors

The Office of Governor Economic Development and Tourism of the State of Texas

Series B Investors

Bennett, William
Carlson, Rolland
Finch, Michele
Hershey, John and Panda
Hershey, John D.
Maxson Jr., Robert E.
Smitheal, Jeremy
The Steinhardt/Alderton 2005 Revocable Living Trust
Winkler, Matthew

Series A Investors

Ann S. Bowers Separate Property Trust
Asuragen, Inc.
Bennett, William
Blackstone Holdings III, LP Quebec SEC
BPEF 2 Ambion Partners, LP
Brown, David

Carlson, Rolland
Dahler, John
Dan Hill and Associates Money Purchase Pension Plan
Earl, Christopher D.
Glassmeyer, Penelope M.
Growth Capital Partners, L.P.
Hajim, Edmund A.
Haverford Florida, LLC
High Plains Investments, LLP
Hime, John A.
Hippocrates Partners, L.P.

HOC Investments, LLC
Hollister, Rachelle
Hunicke-Smith, Scott
Innovative Promotions LLC
Investment Fund, LP
Jacobs, Melvin
James F. Clark, Limited Partner
Jean Calhoun QPRT Trust
Kaderli, Mark D.
Karcher, John D.
Labourier, Emmanuel
Leander, Bruce W.
Lim, Su-min
Lone Juniper, LP (Lone Pine Capital)
Mailer, James L.
Martinez, Noel
Mary P. Adams Family Trust
Maxson Jr., Robert E.
McNabb II, John T.
Miller, Craig
Mont Blanc Holdings, LLC
Mooney, John E.
Moses, Bianca
Moss, Donell
Neufeld, Todd
OKAY Investment Club
The Osterweis Revocable Trust U/A dated 9/13/93
Pasloske, Brittan
Peter Rauenbuehler and Mary L. Mines Trust
The Karen Winkler Phillips Family Trust UTD 3/19/2004
PTV Sciences II, LP
Rebello, James
Robert Calhoun QPRT Trust
RogHen I Limited Partnership
Rutman, James Morgan

Sargent, David W.
Schmaltz, Richard R.
Shelton, Jeffrey and Elizabeth
Sluder, Greenfield
The Steinhardt/Alderton 2005 Revocable Living Trust
Stenzel, Tim
Sullivan, Gregory W.
Suryaputra, Ivonne
TekkiShodan Limited Partnership
Telegraph Hill Partners SBIC, L.P.
Telegraph Hill Partners, L.P.
The Michele Finch Living Trust
The Michael K. Wilson Revocable Trust
THP Affiliates Fund, LLC
Thornburgh, Richard E.
Vallejo, Ramiro R.
Von Rumohr, Cai
Walkerpeach, Cindy
Weiss, Dr. Arnold-Peter C.
Williams, Jeffrey
Winkler, Matthew
Daniel Winkler 2000 Trust
John Winkler 2000 Trust
Joshua Winkler 2000 Trust
Wolfe, Neile P.
Wyper, George U.
Wyper Partners, LLC
Zdeblick, Dr. Thomas A. and Catherine D.

MIRNA THERAPEUTICS, INC.

AMENDMENT NO. 1 TO SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT

THIS AMENDMENT NO. 1 TO SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT (this "***Amendment***") is entered into as of this 21st day of March, 2014, and amends that certain Second Amended and Restated Investor Rights Agreement (the "***Agreement***"), by and among **MIRNA THERAPEUTICS, INC.**, a Delaware corporation (the "***Company***"), and each of the persons and entities listed on **Exhibit A** thereto (the "***Investors***"

and each individually an "***Investor***"). Capitalized terms used herein but not otherwise defined herein shall have the meanings ascribed to such terms in the Agreement.

RECITALS

WHEREAS, the Company and the undersigned Investors desire to amend the Agreement to provide clarification to the definition of the term "Required Holders" with respect to any potential ambiguity that may arise under the existing definition in the event the shares of Preferred Stock convert into shares of Common Stock in connection with an Initial Offering;

WHEREAS, pursuant to Section 5.5 of the Agreement, the Agreement may be amended, modified or terminated and observance of any provision of the Agreement may be waived (either generally or in a particular instance and either retroactively or prospectively) only with the written consent of the Company and the Required Holders;

WHEREAS, any amendment, modification, termination or waiver effected in accordance with Section 5.5 of the Agreement shall be binding upon the Company, each of the other parties to the Agreement and any successor or permitted assignee of any such party whether or not such party, successor or assignee entered into or approved such amendment, modification or waiver; and

WHEREAS, the undersigned Investors constitute the Required Holders under the Agreement.

NOW, THEREFORE, in consideration of these premises and for other good and valid consideration, the receipt and sufficiency of which are hereby acknowledged, the Company and the undersigned Required Holders hereby agree that the Agreement shall be amended as follows:

AGREEMENT

Section 1. **Amendment to Section 1.** Section 1(q) of the Agreement is hereby amended and restated in its entirety to read as follows:

"**(q)** "***Required Holders***" means the Investors holding at least a majority of the then outstanding shares of Common Stock issued or issuable upon the conversion of the Preferred Stock."

Section 2. **Effect of this Amendment.** This Amendment shall form a part of the Agreement for all purposes, and each party thereto and hereto shall be bound hereby. From and after the execution of this Amendment by the parties hereto, any reference to the Agreement shall be deemed a reference to the Agreement as amended hereby. This Amendment shall be deemed to be in full force and effect from and after the execution of this Amendment by the parties hereto. Except as specifically amended as set forth herein, each term and condition of the Agreement shall continue in full force and effect.

Section 3. **Governing Law.** This Amendment shall be governed by and construed under the laws of the State of Delaware in all respects as such laws are applied to agreements among Delaware residents entered into and performed entirely within Delaware.

Section 4. **Counterparts; Electronic and Facsimile Signatures.** This Amendment may be executed in any number of counterparts, each of which when so executed and delivered will be deemed an original, and all of which together shall constitute one and the same agreement. This Amendment may be executed and delivered electronically (including by transmission of .pdf files) and by facsimile and, upon such delivery, such signatures will be deemed to have the same effect as if the original signature had been delivered to the other party.

[THIS SPACE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties hereto have executed this **AMENDMENT NO. 1 TO SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

COMPANY:

MIRNA THERAPEUTICS, INC.

By: /s/ Paul Lammers
Name: Paul Lammers, M.D., M.Sc.
Title: President and Chief Executive Officer

IN WITNESS WHEREOF, the parties hereto have executed this **AMENDMENT NO. 1 TO SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

SOFINNOVA VENTURE PARTNERS VIII, L.P.

By: Sofinnova Management VIII, L.L.C.,
its General Partner

By: /s/ Mike Powell
Name: Mike Powell
Title:

IN WITNESS WHEREOF, the parties hereto have executed this **AMENDMENT NO. 1 TO SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTORS:

NEW ENTERPRISE ASSOCIATES 14, L.P.

By: NEA Partners 14, L.P., its general partner
By: NEA 14 GP, LTD, its general partner

By: /s/ Louis S. Citron
Name: Louis S. Citron
Title: Chief Legal Officer

NEA VENTURES 2012, LIMITED PARTNERSHIP

By: /s/ Louis S. Citron
Name: Louis S. Citron
Title: Vice-President

IN WITNESS WHEREOF, the parties hereto have executed this **AMENDMENT NO. 1 TO SECOND AMENDED AND RESTATED INVESTOR RIGHTS AGREEMENT** as of the date set forth in the first paragraph hereof.

INVESTOR:

PFIZER INC.

By: /s/ Barbara Dalton
Name: Barbara Dalton
Title: VP, Venture Capital

SERVICES AGREEMENT

Between

ASURAGEN, INC.

and

MIRNA THERAPEUTICS, INC.

Dated January 1, 2013

Confidential and Proprietary
Asuragen, Inc.

SERVICES AGREEMENT

This **SERVICES AGREEMENT** (this "**Agreement**") is made as of January 1, 2013 (the "**Effective Date**") between Asuragen, Inc., a Delaware corporation ("**Asuragen**"), and Mirna Therapeutics, Inc., a Delaware corporation ("**Mirna Therapeutics**").

RECITALS

WHEREAS, pursuant to an Asset Contribution Agreement (the "**Contribution Agreement**") dated October 30, 2009, Asuragen contributed the assets and liabilities of its Therapeutics division (the "**Business**") to Mirna Therapeutics (the "**Contribution**");

WHEREAS, in connection with the Contribution, Asuragen and Mirna Therapeutics desire that Asuragen provide Mirna Therapeutics with certain services as set forth in this Agreement at 2150 Woodward Avenue, Suite 100, Austin, Texas 78744 (the "**Facility Site**");

NOW, THEREFORE, in consideration of the premises and for good and valuable consideration, the adequacy, receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

ARTICLE 1
PROVISION OF SERVICES

Section 1.1 Provision of Services.

(a) Asuragen shall provide Mirna Therapeutics with certain services to support and operate the assets of the Business as set forth on Exhibits A1-A3 hereto (collectively, the "**Services**"), in accordance with the performance standards set forth in Section 1.3 during the term of this Agreement as set forth in Section 4.1.

(b) Asuragen may cause one or more of its affiliates, or with the prior written consent of Mirna Therapeutics, third party contractors, to perform the Services; provided, however, that Asuragen shall remain responsible for the provision of the Services under this Agreement.

Section 1.2 Change of Services.

(a) Asuragen and Mirna Therapeutics shall have the right at any time during the term of this Agreement to request changes in or additions to the Services provided to Mirna Therapeutics.

(b) Any change in or addition to the Services shall be authorized by Asuragen and Mirna Therapeutics and evidenced by an amendment to this Agreement, including an amendment to one or more of Exhibits A1- A4, which amendment shall be signed by Asuragen and Mirna Therapeutics. Unless otherwise agreed in writing, the provisions of this Agreement shall apply to all changes in and additions to the Services.

(c) Asuragen and Mirna Therapeutics agree that as of the Effective Date Mirna Therapeutics has 16 employees (the "**Initial Employee Count**"). In the event that at any time during the term of this Agreement the Initial Employee Count increases by twenty-five percent (25%) (the "**Revised Employee Count**"), Asuragen and Mirna Therapeutics agree that the Fee (as defined in Section 2.1) will be adjusted upward to reflect the additional Services which shall be required to accommodate the increased number of Mirna Therapeutics employees. In no event shall the adjustment be less than ten percent (10%) of the Fee.

Asuragen and Mirna Therapeutics agree that such upward adjustment shall occur for each subsequent 25% increase in the Revised Employee Count. Such increases shall be automatic at ten percent (10%) of the Fee in the event the parties do not mutually agree on an alternative price increase.

Section 1.3 Performance Standards. Asuragen agrees to commit to Mirna Therapeutics, on a priority basis, sufficient resources in providing the Services to support, administer and operate the Business with at least the same level, standard of care and timeliness that Asuragen exercised in the management, control and operation of its business during the one year period preceding the Effective Date. Notwithstanding anything herein to the contrary, Asuragen shall continue to perform the Services for Mirna Therapeutics until such time as this Agreement is terminated pursuant to Section 4.1.

Section 1.4 Facility Use Standards. Mirna Therapeutics agrees that it shall:

(a) ensure that any Mirna Therapeutics contractor or visitor is escorted by a Mirna Therapeutics employee at all times while on the Facility Site;

(b) ensure that any Mirna Therapeutics contractor who will be on-site at the Facility Site has executed a confidentiality agreement with provisions at least as restrictive as those contained herein;

(c) employ the same degree of care as to the use of any Asuragen instrument or equipment as it does with regard to Mirna Therapeutics instruments and equipment; and

(c) ensure that all Mirna Therapeutics employees and any Mirna Therapeutics contractor personnel comply at all times with the Asuragen guidelines, policies, procedures, rules and regulations, including all premises rules applicable, now and in the future, to the use of Facility Site and equipment; including, without limitation, those related to environmental quality, safety, fire prevention, noise, information security, and those that prohibit smoking.

Section 1.4 Insurance.

(a) With respect to performing the Services, and in addition to Asuragen's obligation to indemnify Mirna Therapeutics pursuant to Section 3.1 (b) of this Agreement, Asuragen agrees to maintain at all times during the term of this Agreement the following minimum insurance coverage and limits and any additional insurance and/or bonds required by law:

(i) Workers' Compensation insurance with benefits afforded under the laws of the state of Texas and Employers Liability insurance with minimum limits of $100,000 for bodily injury (each accident), $500,000 for bodily injury by disease (policy limits) and $100,000 for bodily injury by disease (each employee).

(ii) Commercial General Liability insurance with minimum limits of: $2,000,000 General Aggregate limit; $1,000,000 each occurrence sub-limit for all bodily injury or property damage incurred in any one occurrence; $1,000,000 each occurrence sub-limit for Personal and Advertising Injury; $2,000,000 Products/Completed Operations Aggregate limit, with a $1,000,000 each occurrence sub-limit for Products/Completed Operations.

(iii) Mirna Therapeutics will be listed as an Additional Insured on the Commercial General Liability policy.

(iv) Asuragen shall also require any subcontractor performing the Services on Asuragen's behalf to maintain the same insurance requirements listed above.

(b) Asuragen agrees to provide Mirna Therapeutics with a certificate of insurance stating the types of insurance and policy limits within thirty (30) days of the Effective Date and to provide Mirna Therapeutics with thirty (30) days written notice of cancellation or material change to such insurance policy.

(c) With respect to Mirna Therapeutics' obligations under this Agreement and to its obligations to indemnify Asuragen pursuant to Section 3.1 (a) of this Agreement, Mirna Therapeutics agrees to maintain at all times during the term of this Agreement the following minimum insurance coverage and limits and any additional insurance and/or bonds required by law:

(i) Workers' Compensation insurance with benefits afforded under the laws of the state of Texas and Employers Liability insurance with minimum limits of $100,000 for bodily injury (each accident), $500,000 for bodily injury by disease (policy limits) and $100,000 for bodily injury by disease (each employee).

(ii) Commercial General Liability insurance with minimum limits of: $2,000,000 General Aggregate limit; $1,000,000 each occurrence sub-limit for all bodily injury or property damage incurred in any one occurrence; $1,000,000 each occurrence sub-limit for Personal and Advertising Injury; $2,000,000 Products/Completed Operations Aggregate limit, with a $1,000,000 each occurrence sub-limit for Products/Completed Operations.

(iii) Asuragen will be listed as an Additional Insured on the Commercial General Liability policy.

(d) Mirna Therapeutics agrees to provide Asuragen with a certificate of insurance stating the types of insurance and policy limits within thirty (30) days of the Effective Date and to provide Asuragen with thirty (30) days written notice of cancellation or material change to such insurance policy.

ARTICLE 2
PAYMENT

Section 2.1 Payment for Services. Subject to Section 2.2, Mirna Therapeutics shall pay Asuragen according to the fee schedule set forth in Exhibit A-4 on the first day of each calendar month during the term of this Agreement beginning February 1, 2013 (the "**Fee**"). The Fee is allocated among the Services as set forth on Exhibits A1-A3. Each such payment will represent the Fee for the Services rendered the preceding month. Payment for the final month of Services shall be made on the first day of the calendar month immediately following the termination of this Agreement. Payment shall be made by check or wire transfer.

Section 2.2 Fee Adjustment. Except as set forth in Section 1.2(c), Mirna Therapeutics and Asuragen shall review the Fee on the twelve-month anniversary of the Effective Date and shall mutually determine, in good faith, whether any adjustments are required to the Fee. Any requested adjustment to the Fee will include a description in reasonable detail of the basis for any such adjustment. At any time during the term of this Agreement, Mirna Therapeutics may terminate any portion of the Services upon thirty (30) days written notice to Asuragen and request a Fee adjustment. Any adjustment in the Fee shall be authorized by Asuragen and Mirna Therapeutics and evidenced by an amendment to this Agreement, which amendment shall be signed by Asuragen and Mirna Therapeutics.

ARTICLE 3
LIABILITY AND INDEMNIFICATION

Section 3.1 Indemnification.

(a) Subject to the limitations set forth in Subsection 3.1(c), Mirna Therapeutics shall, to the fullest extent permitted by law, defend, indemnify and hold harmless Asuragen and its officers, employees and agents from and against any and all claims, actions, damages, expenses (including reasonable attorneys' fees and expenses incurred before trial or at trial or appellate levels), losses, payments, or liabilities (collectively, "**Liabilities**") claimed or asserted against Asuragen or its officers, employees or agents arising as a result of the performance of this Agreement by Mirna Therapeutics (or any of its officers, employees or agents), including Liabilities arising out of the negligence of Mirna Therapeutics (or any of its officer, employees or agents) or a breach of Mirna Therapeutics' obligations or representations and warranties under this Agreement; provided that, Mirna Therapeutics shall not indemnify Asuragen or its officers, employees or agents in the case of their (i) gross negligence or (ii) willful misconduct. THE PARTIES INTEND THAT ASURAGEN AND ITS OFFICERS, EMPLOYEES AND AGENTS BE INDEMNIFIED PURSUANT TO THIS AGREEMENT FROM LIABILITY FOR THEIR OWN, SOLE, PARTIAL OR CONCURRENT NEGLIGENCE.

(b) Subject to the limitations set forth in Subsection 3.1(c), Asuragen shall, to the fullest extent permitted by law, defend, indemnify and hold harmless Mirna Therapeutics and its officers, employees and agents from and against any and all Liabilities claimed or asserted against Mirna Therapeutics or its officers, employees or agents arising as a result of the performance of this Agreement by Asuragen (or any of its officers, employees or agents), including Liabilities arising out of the negligence of Asuragen (or any of its officers, employees or agents) or a breach of Asuragen's obligations or representations and warranties under this Agreement; provided that, Asuragen shall not indemnify Mirna Therapeutics or its officers, employees or agents in the case of their (i) gross negligence or (ii) willful misconduct. THE PARTIES INTEND THAT MIRNA THERAPEUTICS AND ITS OFFICERS, EMPLOYEES AND AGENTS BE INDEMNIFIED PURSUANT TO THIS AGREEMENT FROM LIABILITY FOR THEIR OWN, SOLE, PARTIAL OR CONCURRENT NEGLIGENCE.

(c) Neither Mirna Therapeutics, Asuragen nor their respective officers, employees or agents shall be liable to the other for any special, indirect or consequential damages arising in connection with this Agreement, whether based on breach of contract, breach of warranty, tort, strict liability or otherwise.

(d) If either party hereto (each, an **"Indemnified Party"**) shall receive notice or have knowledge of any claim that may result in a claim for indemnification pursuant to Section 3.1 such Indemnified Party shall, as promptly as possible, give the indemnifying party notice of such claim, including a reasonably detailed description of the facts and circumstances relating to such claim, and a complete copy of all notices, pleadings and other papers related thereto, and in reasonable detail the basis for its potential claim for indemnification with respect thereto; provided that failure promptly to give such notice or to provide such information and documents shall relieve the indemnifying party from the obligation hereunder to respond to or to defend the Indemnified Party failing to give such notice against such claim only to the extent such failure prejudiced the interests of the indemnifying party with respect to such claim. The party against whom indemnification is claimed shall, upon its acknowledgement in writing of its obligation to indemnify the Indemnified Party seeking indemnification, be entitled to assume the defense or to represent the interests of the Indemnified Party seeking indemnification in respect of such claim, which shall include the right to select and direct legal counsel and other consultants, appear in proceedings on behalf of such Indemnified Party and to propose, accept or reject offers of settlement, all at its sole cost; provided, however, that without the Indemnified Party's consent, which consent may not be unreasonably withheld, the indemnifying party may not consent to entry of a judgment or settlement if such judgment or settlement provides for injunctive or other nonmonetary relief affecting the Indemnified Party or require any payment to be made by the Indemnified Party.

ARTICLE 4
TERMINATION OF SERVICES

Section 4.1 Term; Termination Rights. The term of this Agreement shall commence as of the Effective Date and shall terminate, and have no further force or effect, in respect to either party hereto, upon the earliest of the following: (a) December 31, 2014 or (b) written agreement of Asuragen and Mirna Therapeutics; provided, however that Asuragen or Mirna Therapeutics may, in its sole discretion, terminate this Agreement at any time upon one hundred and eighty (180) days' notice to the other party. Asuragen and Mirna Therapeutics agree that Article 3 and Article 5 will survive termination of this Agreement. Either party may terminate this Agreement immediately in the event of liquidation, bankruptcy or insolvency of the other party or the appointment of a receiver or trustee for the property of the other party, or if the other party makes an assignment for the benefit of creditors, whether any of the aforesaid events are the outcome of a voluntary act or otherwise.

ARTICLE 5
MISCELLANEOUS

Section 5.1 Relationship of the Parties. The relationship between Asuragen and Mirna Therapeutics established under this Agreement is that of independent contractors, and this Agreement is not intended to establish, and shall not be construed as establishing, any relationship of partnership, joint venture or any other association between the parties. No officer, employee or agent of Asuragen shall be or shall be deemed to be the officer, employee or agent of Mirna Therapeutics by virtue of this Agreement and nothing in this Agreement shall be construed to make Mirna Therapeutics an employer, directly or indirectly, of any of Asuragen's employees under any applicable law. Asuragen will be solely and entirely responsible for its acts and the acts of its officers, employees and agents during the performance of this Agreement. Asuragen has no right or authority to enter into any contract, warranty, guarantee of other undertaking in the name or for the account of Mirna Therapeutics, or to assume or create any obligation or liability of any kind, express or implied, on behalf of Mirna Therapeutics, or to bind Mirna Therapeutics in any manner whatsoever, or to hold itself out as having any right, power or authority to create any such obligation or liability on behalf of Mirna Therapeutics or to bind Mirna Therapeutics in any manner whatsoever (except as to any actions taken by Asuragen at the express written request and direction of Mirna Therapeutics). Mirna Therapeutics will have no supervision or control over any Asuragen employees, agents and independent contractors.

Section 5.2 No Fiduciary Duties. Each party hereto shall not have any fiduciary obligations or duties to the other party by reason of this Agreement. Either of the parties hereto may conduct any activity or business whether or not such activity or business is in competition with any activity or business of the other party, subject to the terms of any separate written agreements between Mirna Therapeutics and/or certain of its officers and Asuragen.

Section 5.3 No Representations or Warranties. Asuragen represents that it will discharge its duties in connection with Services provided hereunder in good faith, in accordance with past practices and industry standards, and with reasonable diligence. EXCEPT AS SET FORTH IN THE IMMEDIATELY PRECEDING SENTENCE, ASURAGEN MAKES NO (AND HEREBY DISCLAIMS AND NEGATES ANY AND ALL) WARRANTIES OR REPRESENTATIONS WHATSOEVER, EXPRESS OR IMPLIED, WITH RESPECT TO THE SERVICES.

Section 5.4 Force Majeure. Asuragen shall have no obligation to perform the Services if its failure to do so is caused by or results from (a) an act of God; (b) a strike, lockout, labor difficulty or other industrial disturbance; (c) an act of a public enemy, war, terrorism, blockade, insurrection or public riot; (d) lightning, fire, storm, flood or explosion; (e) governmental action, delay, restraint or

inaction; (f) judicial order or injunction; (g) material shortage or unavailability of equipment; or (h) any other cause or event, whether of the kind specifically enumerated above or otherwise, which is not reasonably within the control of Asuragen.

Section 5.5 Further Acts. Each party shall from time to time, and at all times, perform such further acts and execute and deliver all such further deeds and documents as shall be reasonably requested by the other party in order to fully perform and carry out the terms of this Agreement.

Section 5.6 Notices. All notices required to be given hereunder shall be in writing and shall be deemed to be duly given if personally delivered, or mailed by certified mail, return receipt requested, or overnight delivery service with proof of receipt maintained, at the following address (or any other address that any such party may designate by written notice to the other parties):

in the case of Asuragen, to:
Asuragen, Inc.
2150 Woodward Street, Ste. 100
Austin, Texas, 78744
Attention: General Counsel

in the case of Mirna Therapeutics, to:
Mirna Therapeutics, Inc.
2150 Woodward Street, Ste. 100
Austin, Texas 78744
Attention: President

Any such notice shall, if delivered personally, be deemed received upon delivery; shall, if delivered by overnight delivery service, be deemed received the first business day after being sent; and shall, if delivered by mail, be deemed received upon the earlier of actual receipt thereof or five (5) business days after the date of deposit in the United States mail.

Section 5.7 Entire Agreement. This Agreement, the Exhibits hereto together with the other writings referred to herein or delivered pursuant hereto, constitutes the entire agreement between the parties hereto with respect to the subject matter hereof and supersedes all prior agreements and understandings, both written and oral, between the parties with respect to the subject matter hereof.

Section 5.8 Binding Effect; Assignment. Neither party may assign this Agreement without the express written consent of the other party, which consent shall not be unreasonably withheld. No prior written consent for the assignment of this Agreement shall be required if (a) the assignment is made to a successor in interest, by merger, by operation of law, or by assignment, purchase, or otherwise of the entire business of the assigning party, or their successors; or (b) the assignment is made to an affiliate of the assigning party; provided that any such assignee under (a) or (b) herein agrees in writing to be bound by the terms and conditions of this Agreement. Notwithstanding the foregoing, this Agreement shall be binding upon and shall inure to the benefit of Mirna Therapeutics, Asuragen and their respective successors and permitted assigns, and by their signatures hereto, each party intends to and does hereby become bound. Nothing expressed or mentioned in this Agreement is intended or shall be construed to give any person other than the parties hereto and their respective successors and permitted assigns any legal or equitable right, remedy or claim under, in or in respect of this Agreement or any provision herein contained.

Section 5.9 Counterparts. This Agreement may be executed by the parties hereto in any number of counterparts (including, without limitation, facsimile counterparts), each of which shall be deemed an original, but all of which shall constitute one and the same agreement. Each counterpart may consist of a

number of copies hereof each signed by less than all, but together signed by all, the parties hereto.

Section 5.10 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of Texas (without giving effect to the choice of law principles thereof) as such laws are applied to contracts made and to be fully performed entirely within that state between residents of that state. All disputes arising out of this Agreement shall be subject to the exclusive jurisdiction and venue of the Texas state courts of Travis County, Texas, (or, if there is exclusive federal jurisdiction, the United States District Court for the Western District of Texas) and the parties consent to the personal and exclusive jurisdiction and venue of these courts.

Section 5.11 Severability. If any term, provision, covenant or restriction of this Agreement is held by a court of competent jurisdiction to be invalid, illegal, void or unenforceable, the remainder of the terms, provisions, covenants and restrictions set forth herein shall remain in full force and effect and shall in no way be affected, impaired or invalidated, and the parties hereto shall use their best efforts to find and employ an alternative means to achieve the same or substantially the same result as that contemplated by such term, provision, covenant or restriction. It is hereby stipulated and declared to be the intention of the parties that they would have executed the remaining terms, provisions, covenants and restrictions without including any of such that may be hereafter declared invalid, illegal, void or unenforceable.

Section 5.12 Injunctive Relief. The parties hereto acknowledge and agree that irreparable damage would occur in the event any of the provisions of this Agreement were not performed in accordance with their specific terms or were otherwise breached. It is accordingly agreed that the parties shall be entitled to an injunction or injunctions to prevent breaches of the provisions of this Agreement without the requirement of posting a bond or other security, and shall be entitled to enforce specifically the provisions of this Agreement, in any court of the United States or any state thereof having jurisdiction, in addition to any other remedy to which the parties may be entitled under this Agreement or at law or in equity, including, but not limited to the right to cover by the procurement of substitute services.

Section 5.13 Modification; Amendment. Subject to obtaining the necessary regulatory approvals, this Agreement may not be modified or amended except by an instrument in writing signed by each of the parties hereto or by their respective successors or permitted assigns.

Section 5.14 Waiver. No failure or delay by a party hereto in exercising any right, power or privilege hereunder shall operate as a waiver thereof nor shall any single or partial exercise thereof preclude any other or further exercise thereof or the exercise of any other right, power or privilege.

Section 5.15 Descriptive Headings. The descriptive headings herein are inserted for convenience of reference only, do not constitute a part of this Agreement, and shall not affect in any manner the meaning or interpretation of this Agreement.

Section 5.16 **Gender.** Pronouns in masculine, feminine, and neuter genders shall be construed to include any other gender, and words in the singular form shall be construed to include the plural and vice versa, unless the context otherwise requires.

Section 5.17 **References.** All references in this Agreement to Sections and other subdivisions refer to the Sections and other subdivisions of this Agreement unless expressly provided otherwise. The words "this Agreement," "herein," "hereof," "hereby," "hereunder" and words of similar import refer to this Agreement as a whole and not to any particular subdivision unless expressly so limited. Whenever the words "include," "includes" and "including" are used in this Agreement, such words shall be deemed to be followed by the words "without limitation." Unless otherwise expressly provided, any term defined herein by reference to any other document shall be deemed to be amended herein to the extent that such

term is subsequently amended in such document.

Section 5.18 **Confidentiality of Information.**

(a) Each party to this Agreement agrees to keep all information of the other party, whether provided by or generated on behalf of the other party (the "**disclosing party**") to it pursuant to this Agreement (the "**receiving party**") confidential, and a receiving party shall not, without the prior written consent of an authorized senior officer of the disclosing party, disclose any part of such information which is not available in the public domain from public or published information or sources except:

(i) to those of its employees who require access to the information in connection with performance of the Services by a receiving party under this Agreement;

(ii) as in the receiving party's judgment may be appropriate to be disclosed in connection with the provision by the receiving party of the Services hereunder;

(iii) as the receiving party may be required to disclose in connection with the preparation by the receiving party or any of its affiliates of reporting documents, including annual financial statements, annual reports and any filings or disclosure required by statute, regulation or order of a regulatory authority; and

(iv) to such legal and accounting advisors, valuers and other experts as in the receiving party's judgment may be appropriate or necessary in order to permit the receiving party to rely on the services of such persons in carrying out the receiving party's duties under this Agreement.

(b) This Section 5.18 shall not apply to any information:

(i) which is at the time of disclosure in, or after disclosure falls into, the public domain through no fault of the receiving party or its personnel: or

(ii) which is received by the receiving party from a third party who, insofar as is known to the receiving party, is lawfully in possession of such information and not in breach of any contractual, legal or fiduciary obligation to the disclosing party and who has not required the receiving party to refrain from disclosing such information to others.

(c) If a party is required by judicial or administrative process to disclose confidential information of the other party, the party shall notify the other party and allow the other party a reasonable time to oppose such process.

(d) For the purposes of this Section 5.18, it is understood and agreed that all information and data, whether historical or current, relating to the operations or assets of the Business are deemed to be confidential and proprietary information of the Mirna Therapeutics.

(e) This section will survive termination of this Agreement for a period of five (5) years.

Section 5.19 **Confidentiality of Protected Health Information.**

(a) Mirna Therapeutics agrees and acknowledges that Asuragen is a Covered Entity as defined in the Health Insurance Portability and Accountability Act of 1996 ("'HIPAA"), including all pertinent regulations (45 CFR Parts 160 and 64) issued by the U.S. Department of Health and Human Services, as

either have been amended by Subtitle D of the Health Information Technology for Economic and Clinical Health Act (the "HITECH Act"), and that Asuragen routinely receives, processes and stores Protected Health Information in electronic and paper form at the Facility Site. "Protected Health Information" or "PHI" shall have the same meaning as the term "protected health information" in 45 CFR §164.501.

(b) Mirna Therapeutics represents and warrants that it shall:

(i) identify each new Mirna Therapeutics employee to the Asuragen Human Resources Manager to permit each new Mirna Therapeutics employee to participate in required training, including but not limited to the protection of PHI;

(ii) ensure that in the event a Mirna Therapeutics employee views or has access to PHI, such Mirna Therapeutics employee does not transmit such PHI to any other person, including but not limited to other Mirna Therapeutics or Asuragen employees;

(iii) immediately notify the Asuragen Compliance Officer in the event that it becomes aware of any access to or disclosure of PHI by a Mirna Therapeutics employee, but in no event later than five (5) days following discovery of any suspected or actual access or disclosure; and

(iv) Mirna Therapeutics shall cooperate with Asuragen in investigating the potential or actual access or disclosure and in meeting Asuragen's obligations under HIPAA, the HITECH Act and any other state or federal privacy or security breach notification laws.

(c) Failure to comply with the provisions of this Section 5.19 shall be deemed a material breach of this Agreement.

Section 5.20 Existence of Agreement. Either party may disclose the existence, terms and conditions of this Agreement to prospective investors, provided that any such party to whom disclosure is permitted has agreed to keep such information confidential.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement with effect as of the date first above written.

ASURAGEN, INC.

By: /s/ Lynne Hohlfeld
Name: Lynne Hohlfeld
Title: CFO

MIRNA THERAPEUTICS, INC.

By: /s/ Dr. Paul Lammer
Name Dr. Paul Lammer
Title: President & CEO

EXHIBIT A
SERVICES

Asuragen shall provide Mirna Therapeutics with certain services for the support and operation of the Business in general as set forth on Exhibits A-1 through A-3.

EXHIBIT
A-1

FINANCE AND ACCOUNTING SERVICES/PURCHASING, AND WAREHOUSE SERVICES

General Accounting:

- Prepare information required by Mirna Therapeutics to assist Mirna Therapeutics in determining its local, state and federal taxes for calendar year 2012 including property, franchise and income taxes.
- Prepare accounting information and analysis required by Mirna Therapeutics to comply with any internal or external audits of Mirna Therapeutics' financial records for calendar year 2012.

Payroll:

- Prepare W-2's and all other payroll related government reporting for calendar year 2012.
- Manage and fund the external 4 0 1 (k) plan for Mirna Therapeutics.
- Ensure all 401(k) deposits, tax returns, reporting requirements are kept current.
- Prepare documentation and perform testing to support external audit of joint Asuragen and Mirna Therapeutics 401(k) plan.

Shipping and Materials Services

- Receive finished good and shipping supplies and distribute to Mirna Therapeutics employees.

EXHIBIT A-2

INFORMATION TECHNOLOGY SERVICES

Services for Information Technologies will include the following areas: Network, Security, Intranet, Help Desk, Telecommunications, Applications, Data Backup, and Internet. Asuragen will maintain all IT records of Mirna Therapeutics and provide services in accordance with the past practices of Asuragen unless otherwise noted. Specific services for each are described below.

Network

- Create, modify, and manage user and system accounts
- Manage user authentication and access rights systems
- Manage hi-speed internet connectivity
- Provide managed & secure remote access (to remote users and sites)

- Manage internal and external DNS services
- Manage all internal networking infrastructure (servers, routers, switches)

Security

- Manage intrusion prevention and detection systems (firewall)
- Manage and provide up-to-date virus prevention systems
- Manage all remote access and VPN systems

Intranet

- Manage dedicated intranet web server
- Provide web design and other basic HTML related services as needed

Helpdesk

- Provide IT Help Desk application for trouble ticket submission and tracking. Asuragen will provide call back within 24 hours on Help Desk submissions unless deemed critical in which case call back will be within 4 hours.
- Provide all end-user hardware and software support

Telecommunications

- Manage and maintain internal telecommunications systems (PBX)
- Add new extensions as needed
- Provide end-user support/training as needed

Applications

- Manage all in-house, mission critical business applications and/or databases that exist as of the Effective Date

Data Backup

- Manage daily, weekly, monthly data backup systems

Internet

- Manage the Mirna Therapeutics website

EXHIBIT
A-3

FACILITIES SERVICES

Facilities support services will include the following areas: regulatory compliance and oversight, security and emergency response, environmental monitoring, construction, capital equipment inventory control and maintenance, building maintenance, housekeeping, moving, deliveries, and safety programs. Asuragen will maintain all records relating to Mirna Therapeutics' facilities and facilities support services and provide all services to Mirna Therapeutics in accordance with the past practices of Asuragen unless otherwise noted. Mirna Therapeutics will appoint a representative to coordinate with Asuragen in connection with facilities support services.

Specific services are described below.

Regulatory

- Provide all necessary services to maintain regulatory compliance, including, but not limited to laws related to and regulations promulgated by the City of Austin, DEA, and USDA. Such services will include, but are not limited to letters of assurance, document management, administration of OHS and ADA policies and procedures, permitting, license applications and administration, submission of necessary reports, responses to inspection requests
- Provide all necessary services for regulatory compliance oversight, including, but not limited to Bloodhome Pathogens Program, OSHA, TCEQ, EPA, Radiation Safety Program and General Safety Program and all related air and water emissions and hazardous waste regulations

Security

- Provide security and monitoring system services, including, but not limited to installation, inspection, repair, maintenance and administration of badges and keys and all matters related to security patrol
- Respond to after hours alarm calls
- Provide emergency response support

Environmental Monitoring

- Provide system installation, maintenance, equipment relocation, administration, alarm response and training procedures; troubleshoot equipment and environmental problems

Incidental Project Services

- Troubleshoot equipment or environmental problems

· Provide labor, equipment or outside services, as required

Inventory. Equipment and Building Systems

· Provide building systems services, including, but not limited to, HVAC, air systems, plumbing, boilers, fire system, generators, electrical plumbing, refrigeration, preventative maintenance and unscheduled maintenance, such as fixing lighting, workstation and office equipment or other building problems
· Assist with outside vendor negotiations, contracts and maintenance
· Respond to Facilities Assistance Requests, as required

Housekeeping

· Oversee custodial/janitorial vendor and provide additional services as required, including but not limited to inspections
· Coordinate special events
· Respond to and resolve special housekeeping issues, including, but not limited to spills,

workstation/bench issues, biohazard waste issues, lab cleaning

Property Management

· Provide property management services, including, but not limited to recycling and non-hazardous waste program, addressing and resolving parking lot and grounds issues, pest control issues, exterior building and roof issues, as required

Facilities Administration

· Provide administrative support for facilities matters, including, but not limited to, filing documentation, training users, Geiger counter calibration, film badges, waste manifests, injury records, meeting organization
· Respond to audit inquiries
· Respond to facilities work orders
· Provide safety training
· Initiate surveys and provide analysis
· Provide incident investigation and emergency response services, including, but not limited to corrective action, follow up, spill response and abatement, training and oversight of evacuation drill coordinator and emergency personnel liaison

Environmental, Health and Safety Program Services

· Provide all services related to environmental, health and safety programs and administration for needed programs, including, but not limited to MSDS Program (new products, 6X16 split, old products, customer requests), Radiation Program, Chemical Safety Program, Exposure Control Program, Ergonomics Program, Waste Management Program, Safety Committee, Environmental Monitoring and other safety related issues

EXHIBIT
A-4

SERVICE FEE ALLOCATION

MONTH	2013	2014
January	$ 46,622	$ 44,291
February	$ 43,626	$ 39,625
March	$ 48,610	$ 44,758
April	$ 41,156	$ 42,336
May	$ 40,840	$ 42,011
June	$ 45,578	$ 46,890
July	$ 42,914	$ 44,146
August	$ 42,605	$ 43,829
September	$ 44,603	$ 45,886
October	$ 43,702	$ 44,958
November	$ 40,892	$ 42,064
December	$ 46,214	$ 47,546
TOTAL	**$ 527,363**	**$ 528,341**

The schedule above does not include 401(k) employee contribution and employer match amounts, which will be processed by Asuragen each pay period, and reimbursed upon funding via a wire transfer from Mirna Therapeutics to Asuragen. The amounts to be paid will be calculated by Mirna Therapeutics via payroll and communicated to Asuragen in a timely manner for concurrent processing with Asuragen's employee and employer contribution amounts.

Exhibit 10.1(B)

AMENDMENT NO.1 TO THE SERVICES AGREEMENT

This Amendment No. 1 (the "**Amendment**") effective as of October 31, 2014 (the "**Amendment Effective Date**"), to the Services Agreement (the "**TSA**") dated January 1, 2013 is made by and between Mirna Therapeutics, Inc. ("**Mirna Therapeutics**") and Asuragen, Inc. ("**Asuragen**").

WHEREAS, Asuragen and Mirna Therapeutics entered into the TSA;

WHEREAS, Asuragen and Mirna Therapeutics desire to amend the TSA to revise the conditions for termination and the Exhibits;

NOW THEREFORE, in consideration of the above provisions and the mutual agreements contained herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Asuragen and Mirna Therapeutics agree as follows:

1. **Intent.** Except as expressly provided in this Amendment, the Agreement will remain unchanged and in full force and effect in accordance with its original terms. Capitalized terms not defined in this Amendment shall have the meaning set forth in the Agreement.

2. **Recitals.** The following recital will be added to the TSA:

   WHEREAS, Asuragen and Mirna Therapeutics are parties to a certain Sublease Agreement, dated as of October 31, 2014 (as amended from time to time, the "**Sublease**") pursuant to which Asuragen subleases certain premises to Mirna Therapeutics;

3. **Section 4.1. Term; Termination Rights**. The first sentence of Section 4.1 will be deleted in its entirety and will be replaced with:

   The term of this Agreement shall commence as of the Effective Date and shall terminate, and have no further force or effect, in respect to either party hereto, upon the earliest of the following: (a) August 31, 2016, or (b) the expiration or earlier termination of the Sublease, or (c) written agreement of Asuragen and Mirna Therapeutics; provided, however that Asuragen or Mirna Therapeutics may, in its sole discretion, terminate this Agreement at any time upon one hundred and eighty (180) days' notice to the other party.

4. **Exhibits A-1, A-2, A-3, A-4.** Exhibits A-1, A-2, A-3, A-4 are hereby deleted and replaced with the attached Exhibits A-1, A-2, A-3, A-4

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first set forth above.

MIRNA THERAPETUICS, INC.		**ASURAGEN, INC.**	
By:	/s/ Jon Irvin	By:	/s/ Lynne Hohlfeld
Name:	Jon Irvin	Name:	Lynne Hohlfeld
Title:	CFO	Title:	CFO

EXHIBIT A
SERVICES

Asuragen shall provide Mirna Therapeutics with certain services for the support and operation of the Business in general as set forth on Exhibits A-1 through A-3.

EXHIBIT
A-1

FINANCE AND ACCOUNTING SERVICES/ PURCHASING, AND WAREHOUSE SERVICES

Payroll:

- Manage and fund the external 401 (k) plan for Mirna Therapeutics through December 31, 2014.
- Ensure all 401 (k) deposits, tax returns, reporting requirements are kept current through December 31, 2014.
- Prepare documentation and perform testing to support external audit of joint Asuragen and Mirna Therapeutics 401(k) plan for the year ended December 31, 2014.

Shipping and Materials Services

- Receive finished good and shipping supplies and distribute to Mirna Therapeutics employees.

EXHIBIT A-2

INFORMATION TECHNOLOGY SERVICES

Services for Information Technologies will include the following areas: Network, Security, Intranet, Help Desk, Telecommunications, Applications, Data Backup, and Internet. Asuragen will maintain all IT records of Mirna Therapeutics and provide services in accordance with the past practices of Asuragen unless otherwise noted. Specific services for each are described below.

Network

- Manage hi-speed internet connectivity
- Manage pre-arranged interfaces with laboratory equipment

Helpdesk

- Provide IT Help Desk application for trouble ticket submission and tracking, for phone system only. Asuragen will provide call back within 24 hours on Help Desk submissions unless deemed critical in which case call back will be within 4 hours.

Telecommunications

- Manage and maintain internal telecommunications systems (PBX)
- Add new extensions as needed
- Provide end-user support/training as needed

The services listed below will be provided by Asuragen until the earlier of December 31, 2014, or the completion of the transition of services to Mirna Therapeutics.

Network

- Create, modify, and manage user and system accounts
- Manage user authentication and access rights systems
- Provide managed & secure remote access (to remote users and sites)
- Manage internal and external DNS services
- Manage all internal networking infrastructure (servers, routers, switches)

Security

- Manage intrusion prevention and detection systems (firewall)
- Manage and provide up-to-date virus prevention systems
- Manage all remote access and VPN systems

Intranet

- Manage dedicated intranet web server
- Provide web design and other basic HTML related services as needed

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Helpdesk

- Provide IT Help Desk application for trouble ticket submission and tracking, for all IT needs except the phone system. Asuragen will provide call back within 24 hours on Help Desk submissions unless deemed critical in which case call back will be within 4 hours.
- Provide all end-user hardware and software support

Applications

- Manage all in-house, mission critical business applications and/or databases that exist as of the Effective Date

Data Backup

- Manage daily, weekly, monthly data backup systems

Internet

- Manage the Mirna Therapeutics website

EXHIBIT
A-3

FACILITIES SERVICES

Facilities support services will include the following areas: regulatory compliance and oversight, security and emergency response, environmental monitoring, construction, building maintenance, housekeeping, and moving. Asuragen will maintain all records relating to Mirna Therapeutics' facilities and facilities support

services and provide all services to Mirna Therapeutics in accordance with the past practices of Asuragen unless otherwise noted. Mirna Therapeutics will appoint a representative to coordinate with Asuragen in connection with facilities support services.

Specific services are described below.

Regulatory

- Provide services to maintain regulatory compliance and oversight, including, but not limited to laws related to and regulations promulgated by the City of Austin, DEA, EPA, OSHA, ADA, and TCEQ. Such services will include, but are not limited to letters of assurance, document management, permitting, license applications and administration, submission of necessary reports, responses to inspection requests

Security

- Provide security and monitoring system services, including, but not limited to installation, inspection, repair, maintenance and administration of badges and keys and all matters related to security patrol
- Respond to afterhours alarm calls
- Provide emergency response support

Environmental Monitoring

- Provide system installation, maintenance, equipment relocation, administration, alarm response and training procedures; troubleshoot equipment and environmental problems

Incidental Project Services

- Provide labor, equipment or outside services, as required to address the following
    - Facility improvement/repair projects
    - Maintenance, validation, and repair services for leased lab equipment
    - Facility environmental problems

Inventory, Equipment and Building Systems

- Provide building systems services, including, but not limited to, HVAC, air systems, plumbing, boilers, fire system, generators, electrical plumbing, refrigeration, preventative maintenance and unscheduled maintenance, such as fixing lighting, workstation and office equipment or other building problems
- Assist with outside vendor negotiations, contracts and maintenance
- Respond to Facilities Helpdesk Requests

Housekeeping

- Provide and manage custodial/janitorial vendor services.
- Provide additional housekeeping services as required, including but not limited to inspections
- Provide set up and coordination support for special events
- Respond to and resolve special housekeeping issues, including, but not limited to spills

Moving

- Provide equipment and furniture moving services.

Facilities Administration

- Provide administrative support for facilities matters
    - Property Management / Landlord coordination on lease supported services such as roof repair
    - Recycling and non-hazardous waste program
    - Pest control program
    - Chemical and biohazard waste disposal program
    - Supply and manage office and lab furnishings

- Respond to audit inquiries
- Respond to facilities Helpdesk request

Environmental, Health and Safety Program Services

- Asuragen will maintain a safety program that covers the facility and Asuragen employees
- Asuragen will provide auditing support of MIRNA employee manage safety program
- Asuragen will provide incident investigation and emergency response services, including, but not limited to corrective action, follow up, spill response and abatement, training and oversight of evacuation marshals and emergency response personnel

SERVICE FEE ALLOCATION

MONTH	2014	2015	2016
January		$ 32,525	$ 35,911
February		$ 32,525	$ 35,911
March		$ 32,525	$ 35,911
April		$ 32,525	$ 35,911
May		$ 32,375	$ 35,911
June		$ 32,375	$ 35,911
July		$ 32,375	$ 35,911
August		$ 32,375	$ 35,911
September		$ 32,375	
October		$ 32,375	
November	$ 33,413	$ 32,375	
December	$ 33,413	$ 32,375	
TOTAL	**$ 66,827**	**$ 389,102**	**$ 287,288**

The schedule above does not include 401(k) employee contribution and employer match amounts, which will be processed by Asuragen each pay period until December 31, 2014, and reimbursed upon funding via a wire transfer from Mirna Therapeutics to Asuragen. The amounts to be paid will be calculated by Mirna Therapeutics via payroll and communicated to Asuragen in a timely manner for concurrent processing with Asuragen's employee and employer contribution amounts.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

CROSS LICENSE AGREEMENT

This Cross License Agreement (this "**Agreement**") is made as of the **Effective Date** (as such term is defined below) by and between Asuragen, Inc., a Delaware corporation with its principal offices at 2150 Woodward St., Austin, Texas 78744 ("**Asuragen**") and Mirna Therapeutics, Inc., a Delaware corporation with an office at 2150 Woodward Street, Austin, Texas 78744 ("**Mirna**"); (each of Asuragen and Mirna is referred to herein as "**Party**" and together as the "**Parties**").

RECITALS

WHEREAS, pursuant to an Asset Contribution Agreement (the "**Contribution Agreement**") between Asuragen and Mirna which agreement closed on the Effective Date, Asuragen contributed the assets and liabilities of its therapeutics division (collectively, the "**Therapeutics Business**") to Mirna (the "**Contribution**");

WHEREAS, Asuragen and Mirna each own or control certain patent rights and other intellectual property rights as part of their respective businesses;

WHEREAS, the Parties each wish to establish their respective rights and obligations with respect to specified patent rights and other intellectual property rights of the other;

NOW, THEREFORE, in consideration of these premises and the mutual covenants and agreements set forth herein, the sufficiency of which is hereby acknowledged, the Parties agree as follows:

AGREEMENT

1. DEFINITIONS

In addition to other terms defined elsewhere herein, the following terms and expressions, as used in this Agreement, shall have the meanings indicated:

1.1. "**Affiliate**" of a Party shall mean any corporation or other entity that is directly or indirectly controlling, controlled by or under common control with such Party. For the purpose of this definition, "control" shall mean the direct or indirect ownership of more than fifty percent (50%) of the shares of the subject entity entitled to vote in the election of directors (or, in the case of an entity that is not a corporation, for the election of the corresponding managing authority), or more than fifty percent (50%) interest in the income of such entity.

1.2. "**Ancillary Agreements**" shall mean the following agreements between the Parties entered into as of the Effective Date: this Agreement, [***], Services Agreement, [***].

1.3. "**Effective Date**" shall mean the date of the closing of the Asset Contribution Agreement.

1.4. "**Controlled**" shall mean, with respect to any item of technology or the related IP thereto, the possession of the right, whether directly or indirectly, and whether by ownership, license or otherwise, to disclose, deliver, assign, or grant a license, sublicense or other right to or under such applicable technology or related IP, of the scope and as provided for herein, without any of the following: (i) violating the terms of any agreement or other arrangement with any Third Party existing as or the Effective Date; or (ii) violating any law, regulation, rule, code, order or other requirement of any federal, state, foreign, local, or other government body or the need for any additional permits, payments, authorizations, or approvals under any such law, regulation, rule, code, order or requirement.

1.5. "**Therapeutics**" shall mean the field of therapeutics.

1.6. "**Disclosures**" shall mean the technical disclosures, together with any accompanying documents and materials, described in Exhibit C.

1.7. "**Diagnostics**" shall mean the field of diagnostics.

1.8. "**Intellectual Property**" or "**IP**" shall mean and includes all apparatus, assay components, biological materials, cell lines, clinical data, chemical compositions or structures, databases and data collections, diagrams, formulae, inventions (whether or not patentable), know-how, methods, processes, proprietary information, protocols, schematics, specifications, software, software code (in any form including source code and executable or object code), techniques, works of authorship, and other forms of technology (whether or not embodied in any tangible form and including all tangible embodiments of the foregoing such as instruction manuals, laboratory notebooks, prototypes, samples, studies, and summaries), together with any and all Patent Rights, trade secret rights, copyrights and other intellectual property rights in each of the foregoing.

1.9. "**Inventions**" shall mean inventions, discoveries, improvements, processes, formulae, data, works, know-how and other information, patentable or otherwise, that are conceived solely by one or more employees of a Party or jointly by one or more employees of a Party with one or more employees of the other Party, regardless of whether within the scope of any of the Ancillary Agreements or otherwise.

1.10. "**Joint Invention IP**" shall mean all Intellectual Property in and to any Joint Invention (defined in Section 2.2) owned or Controlled jointly by the Parties.

1.11. "**Licensed Method**" shall mean a method that but for the particular license being granted would infringe or misappropriate the Intellectual Property being licensed. For clarity, the definition of Licensed Methods varies and is limited according to the particular Intellectual Property being licensed on a grant-by-grant basis. A Licensed Method under one particular license grant set forth in Article 3 shall not be read to encompass Licensed Methods licensed under a different license grant in such Article 3.

1.12. "**Licensed Product**" shall mean a product or service that but for the particular license being granted would infringe or misappropriate the Intellectual Property being licensed. For clarity, the definition of Licensed Products varies and is limited according to the particular Intellectual Property being licensed on a grant-by-grant basis. A Licensed Product under one

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particular license grant set forth in Article 3 herein shall not be read to encompass Licensed Products licensed under a different license grant in such Article 3.

1.13. "**Mirna Existing IP**" shall mean all Intellectual Property, set forth in Exhibit A owned or Controlled by Mirna immediately following the completion of the Contribution Agreement and acquired by Mirna through the completion of the Contribution.

1.14. "**Patent Rights**" shall mean the issued patents and pending patent applications in any country, including, but not limited to, all provisional applications, substitutions, continuations, continuations-in-part, divisionals, and renewals, all letters patent granted thereon, and all reissues, reexaminations and extensions thereof and all patents and patent applications claiming priority therefrom.

1.15. "**Mirna Developed IP**" shall mean all IP owned or Controlled by Mirna after the Effective Date other than Mirna Existing IP.

1.16. "**Asuragen Licensed IP**" shall mean the IP described in Exhibit B.

1.17. "**Asuragen Developed IP**" shall mean all IP owned or Controlled by Asuragen after the Effective Date other than Asuragen Licensed IP.

1.18. "**Third Party**" shall mean any party or entity other than Asuragen or Asuragen or an Affiliate of either of them.

1.19. "**Valid Claim**" shall mean a claim of an issued and unexpired patent, which has not been held unenforceable, unpatentable or invalid by a court or other governmental agency of competent jurisdiction, and which has not been admitted to be invalid or unenforceable through reissue, disclaimer or otherwise.

2. INTELLECTUAL PROPERTY OWNERSHIP

2.1. Existing Intellectual Property. The Parties acknowledge and agree that upon the closing of the Asset Contribution Agreement, Mirna shall be the exclusive owner of all right, title and interest in and to the Mirna Existing IP subject to the license granted herein to Asuragen. The Parties further acknowledge and agree that Asuragen shall be the exclusive owner of all right, title and interest in and to the Asuragen Existing IP subject to the licenses granted herein to Mirna.

2.2. Post-Effective Date Intellectual Property. Subject to the express licenses granted by either Party to the other Party pursuant to this Agreement and except as otherwise described in the Collaboration Agreement, the entire right, title and interest in and to any and all Inventions conceived: (a) solely by employees or consultants of Asuragen shall be owned solely by Asuragen and be deemed Asuragen Developed IP; (b) solely by employees or consultants of Mirna shall be owned solely by Mirna and be deemed Mirna Developed IP; and (c) jointly by employees or consultants of Asuragen and employees or consultants of Mirna (each a "**Joint Invention**") shall be [***]. If there is a dispute regarding whether or not a Joint Invention is [***], the Parties agree that a senior executives from each Party shall meet to attempt to resolve

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the dispute. If, however, the Parties' senior executives are unable to resolve the dispute within [***], the Parties agree to [***]. The Parties agree that [***].

Any [***] and shall be subject to the obligations set forth in this Agreement. Any [***] and shall be subject to the obligations set forth in this Agreement.

Each Party shall cause its employees and consultants to, make a full disclosure of any and all Inventions, and promptly upon such disclosure, and in no event later than [***] days thereafter, shall provide to the other Party a copy of any disclosure that consists of a Joint Invention. Each Party also agrees to execute any documents necessary to perfect the other Party's rights in a Joint Invention.

2.3. Invention Disclosures. Mirna shall own the Disclosure and all IP therein shall revert to Mirna and all IP therein shall be deemed Mirna Existing IP for all purposes.

3. LICENSE GRANTS

3.1. Asuragen License Grant to Mirna. Asuragen hereby grants to Mirna under the Asuragen Licensed IP a fully paid-up, royalty-free, perpetual, irrevocable worldwide, fully sublicensable and non-transferable (except in accordance with Section 12.5), ***exclusive*** (even as to Asuragen) right and license within the field of Therapeutics to make, have made, use, sell, offer to sell, distribute, have distributed, import, market and otherwise exploit Licensed Products and practice Licensed Methods. Mirna may also use the Asuragen Licensed IP for its internal research efforts.

3.2. Mirna License Grant to Asuragen under Mirna Existing IP. Mirna hereby grants to Asuragen, under the Mirna Existing IP a fully paid-up, royalty-free, perpetual, irrevocable, worldwide, fully sublicensable and non-transferable (except in accordance with Section 12.5), ***exclusive*** (even as to Mirna) right and license within the field of Diagnostics to make, have made, use, sell, offer to sell, distribute, have distributed, import, market and otherwise exploit Licensed Products and to practice the Licensed Methods. Asuragen may also use the Mirna IP for its internal research efforts.

3.3. Rights of Affiliates. Either Party may extend the right and license granted to it under Section 3.1, 3.2 or 3.3, as the case may be, to such Party's Affiliates.

3.4. Access to Existing Know-how. For a period of [***] after the Effective Date, upon reasonable request, each Party shall provide or otherwise make available to the other Party [***], in its possession and in existence immediately after the Effective Date (the "**Existing Know-How**"). Each Party and its Affiliates, licensees and sublicensees may use such Existing Know-How subject to the licenses set forth in Sections 3.1 and 3.2 as reasonably required to exercise

such Party's rights thereunder. Any such disclosed Existing Know-How shall be subject at all times to the confidentiality obligations of Article 11 (Proprietary Information).

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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4. CERTAIN COVENANTS AND RESTRICTIONS

4.1. Employee Solicitation. Each of Asuragen and Mirna hereby agrees it will not directly or indirectly solicit, offer employment to, or employ any employee of the other Party, [***] after the Effective Date, provided; however, that such restriction shall not apply to:

(a) [***];

(b) [***], with the prior written consent of the other Party; or

(c) [***], with the prior written consent of the terminating Party, such consent not to be unreasonably withheld.

4.2. Websites. For a [***] commencing on the Effective Date, Asuragen shall provide [***], in a manner to be mutually agreed upon by the Parties. At Mirna's request, Asuragen shall provide [***], in a manner to be mutually agreed upon by the Parties.

5. REPRESENTATIONS AND WARRANTIES

5.1. Representations and Warranties of the Parties. Each Party represents and warrants to the other Party that (a) each has the full power and authority to enter into this Agreement and to perform its obligations hereunder; (b) each has the requisite right and authority to enter into this Agreement and grant the rights and licenses hereunder, without the need for any license, release, consent, approval or other immunity not yet obtained or issued; and (c) each has not previously granted and will not grant any right or license in any the Patent Rights in Mirna Existing IP, Asuragen Licensed IP, the Yale IP (as applicable) that are inconsistent with the rights and licenses granted herein.

5.2. Disclaimer. EXCEPT AS EXPRESSLY PROVIDED FOR IN THIS AGREEMENT, NEITHER PARTY MAKES, AND EACH PARTY HEREBY DISCLAIMS, ANY AND ALL REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, WITH RESPECT TO THE SUBJECT MATTER OF THIS AGREEMENT, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE.

6. INDEMNIFICATION

6.1. Indemnification by Asuragen. Asuragen shall defend, indemnify and hold harmless Asuragen and its Affiliates, sublicensees and distributors and each of their respective officers, directors, shareholders, employees, agents, successors and assigns from and against all claims, demands, causes of action, suits or proceedings by a Third Party ("**Claims**"), to the extent arising out of (a) a breach by Asuragen of any of its representations, warranties, covenants or agreements under this Agreement, or (b) the manufacture, use, handling, storage, marketing, sale, distribution or other disposition of the any product or service pursuant to the licenses granted herein by Asuragen. Asuragen shall pay any and all damages, liabilities, losses, settlements, costs (including, without limitation, reasonable attorneys' fees and costs), awarded by a court as a result of such Claim. Asuragen's foregoing obligation to indemnify, defend and hold harmless shall not apply to such portion of any Claims arising or resulting from: (i) a

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breach or nonfulfillment of any representation, warranty or covenant of (A) the Company (as defined in the Merger Agreement) set forth in the Merger Agreement; or (B) Asuragen (or any of the other indemnified parties above) set forth in any of the Ancillary Agreements; or (ii) any gross negligence or willful misconduct of Asuragen (or any of the other indemnified parties set forth in this Section 7.1) or of the Company (as defined in the Merger Agreement). Except as provided in the preceding sentence, the foregoing obligation to indemnify, defend and hold harmless shall be in addition to, and not diminish in any way, Asuragen's indemnification obligations pursuant to the other Ancillary Agreements.

6.2. Indemnification by Mirna. Mirna shall defend, indemnify and hold harmless Asuragen and its Affiliates, sublicensees and distributors and each of their respective officers, directors, shareholders, employees, agents, successors and assigns from and against all Claims, to the extent arising out of (a) a breach by Asuragen of any of its representations, warranties, covenants or agreements under this Agreement, or (b) the manufacture, use, handling, storage, marketing, sale, distribution or other disposition of any product or service pursuant to the licenses granted herein by Asuragen, its Affiliates, agents or sublicensees. Mirna shall pay any and all damages, liabilities, losses, settlements, costs (including, without limitation, reasonable attorneys' fees and costs), awarded by a court as a result of such Claim. Asuragen's foregoing obligation to indemnify, defend and hold harmless shall not apply to such portion of any Claims arising or resulting from: (i) a breach or nonfulfillment of any representation, warranty or covenant of (A) the Parent (as defined in the Merger Agreement) set forth in the Merger Agreement; or (B) Asuragen (or any of the other indemnified parties set forth in Section 7.2 above) set forth in any of the Ancillary Agreements; or (ii) any gross negligence or willful misconduct of Asuragen (or any of the other indemnified parties set forth in this Section 7.2) or of the Parent (as defined in the Merger Agreement). Except as provided in the preceding sentence, the foregoing obligation to indemnify, defend and hold harmless shall be in addition to, and not diminish in any way, Asuragen's indemnification obligations pursuant to the other Ancillary Agreements, nor the indemnification obligations set forth in Article X of the Merger Agreement.

6.3. Notice and Procedure. The indemnified Party shall provide indemnifying Party prompt written notice of any such Claim. The indemnifying Party shall have right to control the defense and settlement of such Claim; provided that (a) the indemnifying Party shall not settle any such Claim without the prior written consent of the indemnified Party, which consent will not be unreasonably withheld or delayed and (b) the indemnified Party may, at its option and expense, participate in connection with the defense and settlement of any such Claim. The indemnified Party shall provide, at the indemnifying Party's request and expense, reasonable cooperation in defending or settling any such Claim.

7. LIMITATION ON LIABILITY

EXCEPT FOR INDEMNIFICATION OBLIGATIONS SET FORTH IN SECTION 7, IN NO EVENT SHALL EITHER PARTY BY LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, LOSS OF BUSINESS, LOSS OF USE, LOSS OF PROFITS, OR INTERRUPTION OF BUSINESS, ARISING FROM OR RELATING TO THIS AGREEMENT OR THE SUBJECT MATTER HEREOF, INCLUDING THE BREACH

HEREOF, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, HOWEVER, CAUSED.

8. PROSECUTION AND MAINTENANCE

8.1. Prosecution and Maintenance. Asuragen shall have the first right, but not the obligation, to maintain all patents within Asuragen Licensed IP and to prosecute and maintain any patent applications relating thereto. Mirna shall have the first right, but not the obligation, to maintain all patents within Mirna Existing IP and to prosecute and maintain any patent applications relating thereto. Each Party shall reasonably cooperate and assist the other Party in connection with any prosecution and maintenance activities under this Section 9.1, including for any Joint Invention. The Party responsible for prosecution shall provide the other Party all material documentation and correspondence from, sent to or filed with patent offices regarding the Patent Rights and with a reasonable opportunity to review and comment upon all filings with such patent offices in advance. The costs associated with such prosecution and maintenance activities shall be borne exclusively by the Party responsible for prosecution except where the Parties have agreed to collaborate in which event, the costs shall be divided equally between the Parties.

8.2. Abandoned Patents. In the event that the Party that owns a given issued patent or a given patent application wherein such patent or patent application was in existence prior to the Effective Date and is subject to this Agreement, elects not to continue prosecution of such patent application, or elects not to maintain such issued patent (such patents and applications being "**Abandoned Patents**"), the owning Party shall promptly and on a timely basis, and at least [***] before any deadline for response, submission or other action, notify the other Party thereof and the other Party shall have the right, but not the obligation, at its option, to prosecute and maintain such Abandoned Patents, at such other Party's sole expense. The abandoning Party [***]. The abandoning Party shall reasonably cooperate with and assist the other Party in connection with any prosecution and maintenance activities undertaken by the other Party.

9. INFRINGEMENT AND ENFORCEMENT

9.1. Infringement Claims by Third Parties. With respect to any and all Claims instituted by Third Parties against Asuragen or Asuragen or any of their respective Affiliates for infringement or misappropriation of such Third Parties' intellectual property rights involving the manufacture, use, license, marketing, sale, offer for sale or importation of a product or service that is the subject of a license granted hereunder (each, an "**Infringement Claim**"), Asuragen and Asuragen will assist one another and cooperate (at the cost of the defending Party) in the defense and settlement of such Infringement Claims at the other Party's reasonable request. Notwithstanding any other provision of this Article 10, neither Party shall make any settlements of any suit, proceeding or action relating to any infringement of such Infringement Claim that would adversely affect the other Party or adversely affect the rights and licenses granted hereunder, without first obtaining such other Party's prior written consent, such consent not to be unreasonably withheld or delayed.

9.2. Enforcement Against Third Parties. Absent written agreement of the Parties to the contrary, the Party [***] shall have the sole and exclusive right (in its sole discretion) but not

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the obligation to initiate and maintain legal action at such Party's sole expense against any such infringing Third Party. The Party enforcing such Intellectual Property rights shall [***] and shall have [***].

9.3. Cooperation. In any suit, proceeding or dispute involving infringement or misappropriation by a Third Party of Intellectual Property licensed hereunder, a Party shall promptly notify the other Party when it becomes aware of any such infringement, and each Party shall provide the other with reasonable cooperation and assistance, including agreeing to be named as a party to such action and, upon the request and the expense of the enforcing Party, the other Party shall make available, at reasonable times and under appropriate conditions, all relevant personnel, records, papers, information, samples, specimens and the like in its possession.

10. PROPRIETARY INFORMATION

10.1. Definition. "**Proprietary Information**" means all information and material disclosed by one Party ("**Disclosing Party**") to the other Party ("**Receiving Party**") that is designated, at or before the time of disclosure, as proprietary or confidential, or provided under circumstances reasonably indicating that the information or material is proprietary or confidential. In particular, "Proprietary Information" of each Party is deemed to include all apparatus, assay components, biological materials, cell lines, clinical data, chemical compositions or structures, databases and data collections, diagrams, formulae, inventions (whether or not patentable), know-how, methods, processes, proprietary information, protocols, schematics, specifications, software, software code (in any form including source code and executable or object code), techniques, works of authorship, and other forms of technology (whether or not embodied in any tangible form and including all tangible embodiments of the foregoing such as instruction manuals, laboratory notebooks, prototypes, samples, studies, and summaries), including without limitation, any information pertaining to any Invention.

10.2. Confidentiality of Proprietary Information. Except as otherwise provided in this Agreement. Receiving Party agrees to (a) retain in confidence the Proprietary Information of the Disclosing Party, (b) restrict the use of and access to the Proprietary Information of the Disclosing Party to employees of Receiving Party and its Affiliates to whom disclosure is necessary to exercise the rights and licenses granted in this Agreement, (c) appropriately bind each employee to whom any such disclosure is made to hold the Proprietary Information of the Disclosing Party in confidence, and (d) not sell, lease, assign, transfer or otherwise disclose the Proprietary Information of the Disclosing Party to any Third Party, except Affiliates, in accordance with this Section 11.2. Notwithstanding the foregoing, either Party may disclose Proprietary Information of the Disclosing Party (i) to agents or consultants of such Party and its Affiliates under the terms and conditions of a written, signed confidential disclosure agreement with terms and conditions that prohibit disclosure to other parties and that are otherwise at least as restrictive as the terms of subsections (a) through (d) of this Section 11.2, and (ii) to distributors, licensees, customers, clients, business partners and other third parties to the extent necessary to exercise the rights and licenses with respect to Proprietary Information granted hereunder. Without limiting the foregoing,

each Party agrees that it shall treat the Proprietary Information of the Disclosing Party with at least the same degree of care as it would its own highly proprietary information, but in no event less that a reasonable degree of care.

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10.3. Confidentiality of Agreement. Neither Party shall disclose the terms and conditions or existence of this Agreement without the prior written consent of the other Party, except as may be required by law or regulation. If a Party determines that disclosure is required by law or regulation, it shall consult with the other Party to minimize such disclosure.

10.4. Exclusions. Neither Party shall have any obligation under this Agreement with respect to Proprietary Information that (a) is now, or hereafter becomes, through no act or failure to act on the part of the Receiving Party, generally known or available; (b) is or was known by the Receiving Party at or before the time such information or material was received from the Disclosing Party, as evidenced by the Receiving Party's tangible (including written or electronic) records; (c) is furnished to the Receiving Party by a Third Party that is not under an obligation of confidentiality to the Disclosing Party with respect to such information or material; (d) is independently developed by the Receiving Party without any breach of this Agreement, as evidenced by the Receiving Party's contemporaneous tangible (including written or electronic) records; or (e) is required to be disclosed pursuant to any judicial or governmental request, requirement or order, provided that upon receipt of such request, requirement or order, the Receiving Party shall give the Disclosing Party prompt notice and take all reasonable steps to assist the Disclosing Party in seeking a protective order and shall limit the disclosure to the minimum extent necessary to comply with such request, requirement or order.

10.5. Injunctive Relief. Each Party acknowledges and agrees that, in the event of an unauthorized use, reproduction, distribution or disclosure of any Proprietary Information, an adequate remedy at law would not be available and, therefore, injunctive or other equitable relief would be appropriate to restrain such use, reproduction, distribution or disclosure, whether threatened or actual.

11. GENERAL

11.1. Term. This Agreement shall be irrevocable and remain in force and effect in perpetuity. Notwithstanding the foregoing, any royalty-bearing licenses under Patent Rights shall only remain in force until the last claim of the Patent(s) being licensed expire or until a final decree of invalidity thereof from which no appeal or other judicial recourse can be, or is, taken of the last remaining Patent(s) being licensed.

11.2. Notices. All notices and other communications under this Agreement shall be in writing and shall be deemed given when delivered by hand or upon confirmed receipt of a facsimile transmission, two (2) days after being deposited with an overnight courier, or five (5) days after mailing, postage prepaid, by register or certified mail, return receipt requested, to the below address or such other addresses as either Party shall specify in a written notice to the other.

To Asuragen:
Asuragen, Inc.
2150 Woodward Street, Suite 100
Austin, Texas, 78744
Fax: 512-681-5201
Attn: General Counsel

To Mirna:
Mirna Therapeutics, Inc.
2150 Woodward Street, Suite 100
Austin, Texas, 78744
Fax: 512-681-5201
Attn: General Counsel

11.3. Governing Law; Jurisdiction. This Agreement shall be governed by and construed in accordance with the laws of the United States of America (to the extent federal law is applicable) and the laws of the State of Delaware (to the extent state law is applicable) without giving effect to the choice of law principles thereof. Any dispute arising out of this Agreement shall be subject to the exclusive jurisdiction and venue of the Delaware state courts of New Castle County, Delaware, (or, if there is exclusive federal jurisdiction, the United States District Court for the District of Delaware) and the Parties consent to the personal and exclusive jurisdiction and venue of these courts.

11.4. Relationship of Parties. Nothing contained in this Agreement shall be deemed or construed as creating a joint venture, partnership, agency, employment or fiduciary relationship between the Parties. Neither Party nor its agents have any authority of any kind to bind the other Party in any respect whatsoever, and the relationship of the Parties is, and at all times shall continue to be, that of independent contractors.

11.5. Assignment. This Agreement may not he assigned by either Party without the prior written consent of the other Party, which consent shall not be unreasonably withheld or delayed. Such consent shall not be required for any assignment to a party that succeeds to all or substantially all of the assigning Party's business or assets relating to this Agreement (whether by sale, merger, operation of law or otherwise), provided that such assignee agrees in writing to be bound by the terms and conditions of this Agreement. This Agreement shall be binding upon and shall inure to the benefit of the Parties and their respective successors and permitted assigns.

11.6. Further Assurances. Each Party agrees to take or cause to be taken such further actions, and to execute, deliver and file or cause to be executed, delivered and filed such further documents and instruments, and to obtain such consents, as may be reasonably required or requested in order to effectuate fully the purposes, terms and conditions of this Agreement.

11.7. Waiver. A waiver, express or implied, by either Party of any right under this Agreement or of any failure to perform or breach hereof by the other Party hereto shall not constitute or be deemed to be a waiver of any other right hereunder or of any other failure to perform or breach hereof by such other Party, whether of a similar or dissimilar nature thereto.

11.8. Severability. If any provision of this Agreement is unenforceable or invalid under any applicable law or is so held by applicable court decision, such unenforceability or invalidity will not render this Agreement unenforceable or invalid as a whole, and, in such event, such provision will be changed and interpreted so as to best accomplish the objectives of the Parties within the limits of applicable law or applicable court decision.

11.9. Force Majeure. In the event either Party hereto is prevented from or delayed in the performance of any of its obligations hereunder by reason of acts of God, war, strikes, riots, storms, fires, or any other cause whatsoever beyond the reasonable control of the Party, the Party so prevented or delayed shall be excused from the performance of any such obligation to the extent and during the period of such prevention or delay.

11.10. Captions and Headings. The captions and headings used in this Agreement are inserted for convenience only, do not form a part of this Agreement, and shall not be used in any way to construe or interpret this Agreement.

11.11. Construction. This Agreement has been negotiated by the Parties and shall be interpreted fairly in accordance with its terms and without any construction in favor of or against either Party.

11.12. Counterparts. This Agreement may be executed in one or more counterparts (including, without limitation, by fax), with the same effect as if the Parties had signed the same document. Each counterpart so executed shall be deemed to be an original, and all such counterparts shall be construed together and shall constitute one and the same instrument.

11.13. Entire Agreement; Amendment. This Agreement constitutes the entire understanding and only agreement between the Parties with respect to the subject matter hereof and supersedes any and all prior or contemporaneous negotiations, representations, agreements, and understandings, written or oral, that the Parties may have reached with respect to the subject matter hereof other than the Ancillary Agreements. No agreements altering or supplementing the terms hereof may be made except by means of a written document signed by the duly authorized representatives of each of the Parties hereto.

IN WITNESS WHEREOF, the Parties hereto have caused their duly authorized representatives to execute this Agreement as of the Effective Date.

Mirna Theraeputics, Inc.		**Asuragen, Inc.**	
By:	/s/ Lynne Hohlfeld	By:	/s/ Rolland D. Carlson
Name:	Lynne Hohlfeld	Name:	Rollie Carlson, Ph.D.
Title:	CFO	Title:	President

EXHIBIT A

MIRNA EXISTING IP

Atty Docket No.	Title	Appln No. and Date Filed	Publn No. and Date Published
[***]	[***]	[***]	[***]

[***] 7 pages in this document have been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

EXHIBIT B

ASURAGEN LICENSED IP

Atty Docket No.	Title	Appln No. and Date Filed	Publn No. and Date Published
[***]	[***]	[***]	[***]

[***] 4 pages in this document have been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

FIRST AMENDMENT TO THE CROSS LICENSE AGREEMENT

This First Amendment to the Cross License Agreement (the "First Amendment") is by and between Mirna Therapeutics, Inc. ("Mirna"), a Delaware corporation with a principal business address at 2150 Woodward St., Suite 100, Austin, Texas 78744, and Asuragen, Inc., a Delaware corporation, with a principal business address at 2150 Woodward Street, Austin, Texas 78744 ("Asuragen"), and is effective as of September 28, 2012 (the "First Amendment Effective Date"). All capitalized terms not defined in this First Amendment shall have the meanings given to them in the Cross License Agreement (including Exhibits thereto) entered into by and between Mirna and Asuragen, effective as of November 3, 2009 (the "Agreement").

Whereas, the Asuragen Licensed IP includes the ASUR:009US and ASUR:009WO patent families;

Whereas, the Agreement stipulates that Asuragen controls all prosecution and enforcement of the ASUR:009US and ASUR:009WO patent families; and

Whereas, the Parties desire that Mirna control all prosecution and enforcement of the ASUR:009US and ASUR:009WO patent families.

NOW THEREFORE, in consideration of these premises and the mutual covenants and agreements set forth herein, the sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. The following definitions shall be added to the Agreement:

1.20. "009 Family" means the Asuragen Licensed IP ASUR:009US and ASUR:009WO patent family as set forth in Exhibit B of the Agreement and Exhibit A of this First Amendment and any divisionals, continuations, reexaminations, reissues, and foreign equivalents.

2. The following section shall be added to Section 8:

8.3 Prosecution of the 009 Family. Notwithstanding the foregoing Sections 8.1 and 8.2, Mirna shall have the first right, but not the obligation, to maintain all patents within the 009 Family and to prosecute and maintain any patent applications relating thereto. Mirna shall provide Asuragen all material documentation and correspondence from, sent to or filed with patent offices regarding the 009 Family and with a reasonable opportunity to review and comment upon all filings with such patent offices in advance. The costs associated with such prosecution and maintenance activities shall be borne exclusively by Mirna. In the event that Mirna elects not to continue prosecution of any 009 Family patent applications or elects not to maintain an issued patent from the 009 Family (the "009 Abandoned Patents"), Mirna will promptly and on a timely basis, and at least [***] before any deadline, for response, submission or other action, notify Asuragen thereof and Asuragen shall have the right but not the obligation, at its option, to prosecute and maintain such 009 Abandoned Patents at Asuragen's sole expense. Mirna shall reasonably cooperate with Asuragen and assist Asuragen in connection with the

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prosecution and maintenance activities of any 009 Abandoned Patents, and Mirna shall have no further rights with regard to such 009 Abandoned Patents.

3. The following sentence shall be added after the last sentence of Section 9.2:

Notwithstanding the foregoing, Mirna shall have the sole and exclusive right (in its sole discretion) but not the obligation to initiate and maintain legal action at Mirna's sole expense against any Third Party infringing the any of the Intellectual Property rights of the 009 Family. Mirna shall [***].

4. The first sentence of Section 9.1 shall be deleted and replaced with the following:

"9.1 Infringement Claims by Third Parties. With respect to any and all Claims instituted by Third Parties against Asuragen or Mirna or any of their respective Affiliates for infringement or misappropriation of such Third Parties' intellectual property rights involving the manufacture, use, license, marketing, sale, offer for sale or importation of a product or service that is the subject of a license granted hereunder (each, an "Infringement Claim"), Asuragen and Mirna will assist one another and cooperate (at the cost of the defending Party) in the defense and settlement of such infringement Claims at the other Party's reasonable request.

5. Except as specifically modified or amended hereby, all terms of the Agreement shall remain in full force and effect. No provision of this First Amendment may be modified or amended except expressly by a written amendment of this document signed by the Parties. This First Amendment shall be governed in accordance with Paragraph 11.3 of the Agreement.

In Witness Whereof, the Parties hereto have caused their duly authorized representatives to execute this Agreement as of the Effective Date.

	ASURAGEN, INC.		**MIRNA THERAPEUTICS, INC.**
By:	/s/ Rolland D. Carlson, Ph.D.	**By:**	/s/ Paul Lammers, M.Sc., M.D.
Name:	Rolland D. Carlson, Ph.D.	Name:	Paul Lammers, M.Sc., M.D.
Title:	President/COO	Title:	CEO and President

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Exhibit A
009 Family

[***]	[***]	[***]	[***]

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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LICENSE AGREEMENT

THIS LICENSE AGREEMENT (the "***Agreement***") is made and entered into effective as of December 22, 2011 (the "***Effective Date***") by and between **MIRNA THERAPEUTICS, INC.**, a Delaware corporation with a place of business at 2150 Woodward Street, Suite 100, Austin, Texas 78744 ("***MirnaRx***"), and **MARINA BIOTECH, INC.**, a Delaware corporation with a place of business at 3830 Monte Villa Parkway, Bothell, Washington 98021 USA ("***Marina Bio***"). Marina Bio and MirnaRx are sometimes referred to herein individually as a "Party", and collectively as the "Parties."

RECITALS

WHEREAS, Marina Bio owns or controls certain patent rights and know-how relating to its proprietary oligonucleotide delivery technology that may be useful for delivery of microRNA sequences for use treating certain cancers and other diseases or conditions; and

WHEREAS, MirnaRx has capabilities in the research and development of microRNA drug candidates and products and desires to obtain from Marina Bio, and Marina Bio is willing to grant to MirnaRx, a license under Marina Bio's technology and intellectual property relating to Marina Bio's liposomal delivery technology known as NOV340, to exclusively develop and commercialize drug products containing such delivery technology combined with one or more selected MirnaRx mircoRNA molecules worldwide, on the terms and conditions set forth herein;

NOW, THEREFORE, based on the premises and the mutual covenants and obligations set forth below, and intending to be bound hereby, the Parties agree as follows:

ARTICLE 1

DEFINITIONS

For purposes of this Agreement, the following terms shall have the meanings as set forth below:

1.1 "***Additional Indication***" means, with respect to a particular Licensed Product, an indication for treating or preventing a human disease or condition that is the subject of and covered by a unique NDA application and Regulatory Approval, different from and subsequent to the original Regulatory Approval for such Licensed Product.

1.2 "***Affiliate***" means, with respect to a particular Party, an entity that, directly or indirectly, through one or more intermediaries, controls, is controlled by or is under common control with such Party. For purposes of this definition, the term "control" (with correlative meanings for the terms "controlled by" and "under common control with") means that the applicable entity has the actual power, direct or indirect, to direct and to cause the direction of the management and policies of the applicable other entity, whether through ownership of fifty percent (50%) or more of the voting securities of such other entity, by contract or otherwise. An

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entity will be an Affiliate for purposes of this Agreement only so long as it satisfies the definition set forth above in this Section.

1.3 "***Applicable Law***" means all applicable laws, rules, ordinances, and regulations, including any rules, regulations, guidelines or other requirements of relevant government agencies, that may be in effect from time to time in the applicable country or jurisdiction, applicable to the specific activities being undertaken pursuant to this Agreement.

1.4 "***Available***" means, with respect to a particular MirnaRx Compound for which MirnaRx submits a notice under Section 2.6, that at the time of such notice Marina Bio is not bound by an agreement with a Third Party that grants such Third Party exclusive license rights under the Licensed Technology with respect to such MirnaRx Compound.

1.5 "***Bankrupt Party***" shall have the meaning ascribed to such term in Section 10.2(b).

1.6 "***Claim***" means any claim, allegation, suit, complaint, action or legal proceeding.

1.7 "***Commercialize***" or "***Commercialization***" means those activities comprising or relating to the manufacturing, promotion, marketing, advertising, distribution and sale of Licensed Products, including Phase IV Trials or equivalent clinical trials conducted following Regulatory Approval as needed or useful to promote and market the Licensed Product and/or maintain such Regulatory Approval.

1.8 "***Commercially Reasonable Efforts***" means, with respect to particular tasks or activities hereunder in developing or Commercialization Licensed Product, a level of efforts applied to such tasks or activities reasonably consistent with the efforts commonly used by similarly-situated companies in the pharmaceutical industry to conduct such activities on products at a similar (as compared to the Licensed Product at the applicable time) stage in its product life and of similar market potential, profit potential and strategic value resulting from its own research efforts, based on information and conditions then-prevailing, including, without limitation, efficacy of the product, the competitiveness of alternative products in the marketplace, the patent and other proprietary position of the product, the likelihood of regulatory approval given the regulatory structure involved and the likelihood of adequate reimbursement. Commercially Reasonable Efforts shall be determined on a country-by-country or market-by-market basis (as most applicable) for a particular Licensed Product, and it is anticipated that the level of effort will change over time reflecting changes in the status of the Licensed Product and the country (or markets) involved.

1.9 "***Confidential Information***" of a Party means all confidential or proprietary information received or otherwise obtained by the other Party from such Party or its Affiliates pursuant to this Agreement, other than that portion of such information that:

(a) is now, or hereafter becomes, generally available to the public through no fault of the receiving Party, or its Affiliates, or any entity that obtained such information or materials from the receiving Party;

(b) the receiving Party or its Affiliates already possesses, as evidenced by its written records, prior to receipt thereof from the disclosing Party;

(c) is obtained without restriction from a Third Party that had the legal right to disclose the same to the receiving Party or its Affiliates; or

(d) has been independently developed by the receiving Party or its Affiliates without the aid, application or use of any Confidential Information of the disclosing Party, as demonstrated by competent written proof.

1.10 "***Confidentiality Agreement***" shall mean that certain Confidential Disclosure Agreement dated November 25, 2011, among Marina Bio, MirnaRx and Asuragen, Inc.

1.11 "***Cumulative Sublicense Fees***" shall have the meaning ascribed to such term in Section 5.6.

1.12 "***Default***" shall mean a failure by a Party to perform one or more of its material obligations under this Agreement which, if not cured within the applicable cure period set forth in Section 10.2(c) or (d), is likely to cause material harm to the other Party.

1.13 "***Dispute***" shall have the meaning ascribed to such term in Section 11.1.

1.14 "***Field of Use***" means any use of Licensed Product for or relating to the prophylaxis, treatment or palliation of cancer or any other disease or health condition in humans or animals, *but excluding* any DNAi human therapeutic use.

1.15 "***Field Infringement***" shall have the meaning ascribed to such term in Section 6.4.

1.16 "***Financial Event***" shall have the meaning ascribed to that term in Section 10.2(b).

1.17 "***First Commercial Sale***" means, with respect to a particular country, the first commercial sale of a Licensed Product by MirnaRx, its Affiliates or Sublicensees to a Third Party in a country, after all needed Regulatory Approvals for the Licensed Product have been granted in such country.

1.18 "***GAAP***" means generally accepted accounting principles.

1.19 "***Generic Product***" means, with respect to a Licensed Product, a generic product containing the applicable Selected MirnaRx Compound in a formulation similar to and substitutable for such Licensed Product.

1.20 "***Improvement Patent Claim***" means any claim in a patent application filed by MirnaRx (or in any patent issuing on any such application) that: (i) claims any improvements, modifications or enhancements to the Licensed Technology invented by MirnaRx prior to the date [***] after the Effective Date in conducting manufacturing process development and scale-up with respect to the Licensed Technology under this Agreement, and (ii) cannot be

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practiced without infringing the Licensed Patents, and including for clarity applicable claims in continuing patent applications (such as continuations, divisions, or continuations-in-part) or in any reissue, re-examined or extended patent. For clarity, the term "Improvement Patent Claims" expressly excludes: (x) any claims in patent applications or patents covering inventions made by or on behalf of MirnaRx (or its Affiliate) prior to the Effective Date without use of any Confidential Information or materials of Marina Bio, and (y) any claims in patent applications or patents covering inventions made by or on behalf of MirnaRx (or its Affiliate) after the Effective Date but independent of work done under this Agreement, in each case without use of any Confidential Information or materials of Marina Bio.

1.21 "***IND***" means an Investigational New Drug application, as defined in 21 C.F.R. 312 or any successor regulation or comparable application in accordance with the Regulatory Authority in the applicable jurisdiction.

1.22 "***Indemnified Party***" shall have the meaning ascribed to it in Section 8.3.

1.23 "***Indemnifying Party***" shall have the meaning ascribed to it in Section 8.3.

1.24 "***Information***" means any and all data, results, improvements, processes, methods, protocols, formulas, inventions, know-how, trade secrets and any other information, patentable or otherwise, which may include (but is not limited to) scientific, research and development, manufacturing know-how, pre-clinical, clinical, regulatory, manufacturing, safety, marketing, financial and commercial information or data.

1.25 "***Licensed Know-How***" means any and all proprietary Information owned or controlled by Marina Bio (or its Affiliate) that relates directly to the use or practice of the Licensed Patents and/or is otherwise necessary to develop, make, use or sell Licensed Product.

1.26 "***Licensed Patent***" means:

(a) The patents and patent applications that are owned or controlled by Marina Bio or its Affiliate that claim or cover the Marina Bio Technology (including the manufacture or use thereof), including those patents and patent applications listed in Appendix A of this Agreement;

(b) all additional patent applications based on or relating to the patents and applications set forth in subclause (a) above;

(c) any and all patent applications that are continuing applications (including continuations, continuations-in-part or divisionals, or any foreign equivalents thereof) of the patents and applications described in (a) or (b) above;

(d) any and all issued and unexpired patents resulting from any of the applications described in (a), (b) or (c) above;

(e) any and all issued and unexpired reissues, reexaminations, renewals, extensions (and any foreign equivalents of any of the foregoing) of any of the patents described in (a), (c) or (d) above; and

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(f) any and all supplemental protection certificates (and any foreign equivalents thereof) applicable to products that, prior to the expiration of any patents listed on Appendix A or any patents included in the scope of (d) above, were covered by one or more Valid Claims of such patents.

1.27 "***Licensed Product***" means a pharmaceutical composition developed or sold by MirnaRx (or its Affiliate or Sublicensee) that contains a Selected MirnaRx Compound and Marina Bio Technology and is claimed or covered by the Licensed Patents, and including any improvements, enhancements or modifications to such composition.

1.28 "***Licensed Technology***" means the Licensed Patents and Licensed Know-How.

1.29 "***Losses***" means costs and expenses (including, without limitation, reasonable legal expenses and attorneys' fees), judgments, liabilities, fines, damages, assessments and/or other losses.

1.30 "***Major Market***" means [***]. For clarity, obtaining Regulatory Approval of Licensed Product from [***], shall be deemed to be obtaining a Regulatory Approval in a Major Market for purposes of the applicable provisions of this Agreement.

1.31 "***Manufacturing Processes***" means all Information that is Controlled by Marina Bio or its Affiliates and is used to manufacture the delivery formulation in the Marina Bio Technology.

1.32 "***Marina Bio Indemnitees***" shall have the meaning ascribed. to such term in Section 8.2.

1.33 "***Marina Bio Technology***" means Marina Bio's proprietary NOV340 formulation referred to generally as SMARTICLES® liposomal delivery technology and including any Technology Improvements.

1.34 "***Milestone Payment Sum***" shall have the meaning ascribed to such term in Section 5.6.

1.35 "***miRNA Compound***" means a product containing, comprised of or based on a native or chemically modified RNA oligomer designed to either provide the function of a miRNA and/or modulate a miRNA., where miRNA is understood to be a naturally occurring short RNA molecule found in eukaryotic cells.

1.36 "***MirnaRx Compound***" means any miRNA Compound that is researched or developed by MirnaRx (or its Affiliate) for use in the Field of Use.

1.37 "***MirnaRx Indemnitees***" shall have the meaning ascribed to such term in Section 8.1.

1.38 "***NDA***" means a New Drug Application, as defined in 21 C.F.R. 314, and any other appropriate application or registration submitted to the appropriate Regulatory Authority in

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a particular country in the Territory to seek Regulatory Approval for sale of Licensed Product in such country.

1.39 "***Net Sales***" means, with respect to a certain time period, all revenues recognized, and deductions applied, in accordance with GAAP consistently applied, based on invoices for the sales of Licensed Products sold by MirnaRx or its Affiliate to Third Parties (but not including sales relating to transactions between MirnaRx, its Affiliates and/or its respective Sublicensees and agents) during such time period, less the total of the following estimated and/or incurred charges or expenses with respect to such sales: (a) [***]; (b) [***]; (c) [***]; (d) [***]; (e) [***]; (f) [***]; and (g) [***].

Any disposal of Licensed Products for, or use of Licensed Products in, clinical or pre-Clinical trials, given as free samples, including, without limitation, sample cards, or distributed for indigent programs shall not be included in Net Sales.

Upon any sale or other disposal of any Licensed Product that should be included within Net Sales for any consideration other than an exclusively monetary consideration on bona fide arm's-length terms, then for purposes of calculating the Net Sales under this Agreement, [***].

1.40 "***Option Compound***" means any of the MirnaRx Compounds on the list in the Side Letter (not to exceed [***] compounds, but subject to the substitution rights in Section 2.6), or, for any such MirnaRx Compound, any other MirnaRx Compound that has at least [***]% sequence homology with such compound.

1.41 "***Phase IV Trial***" means a clinical trial of a pharmaceutical product initiated in a country in an approved indication after receipt of Regulatory Approval for such product in such indication in such country, intended to delineate additional information about such product's risks, benefits and/or optimal use.

1.42 "***Prosecution***" shall have the meaning ascribed to such term in Section 6.3,

1.43 "***Regulatory Approval***" means all approvals (including supplements, amendments, pre- and post-approvals and price approvals), licenses, registrations or authorizations of any national, supra-national, regional, state or local regulatory agency, department, bureau, commission, council or other governmental entity, necessary for the distribution, use or sale of a Licensed Product in the applicable country or regulatory jurisdiction.

1.44 "***Regulatory Authority***" means any regulatory agency, department, bureau, commission, council or other governmental entity involved in granting approvals, registrations or licenses for the development, manufacturing, marketing, reimbursement, and/or pricing of a Licensed Product in a particular country or regulatory jurisdiction.

1.45 "***Regulatory Documents***" means all regulatory documents and filings, correspondence with Regulatory Authorities, annual reports and amendments thereto related to a Licensed Product.

1.46 "***Royalty Term***" means, as to a particular Licensed Product sold in a country, the period from the date of First Commercial Sale of such Licensed Product in such country until the

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later of: (i) the date of expiration of the last to expire patent included in the Licensed Patents having a Valid Claim that claims the Licensed Product in such country, or (ii) [***] after such First Commercial Sale of the Licensed Product in. such country.

1.47 "***Royalties Report***" shall have the meaning ascribed to such term in Section 5.7.

1.48 "***Selected MirnaRx Compound***" means: (a) the MirnaRx Compound known as miR-34 (the sequence of which is set forth in the Side Letter); or (b) any other MirnaRx Compound that MirnaRx selects, as provided in Section 2.6, to combine with the Marina Bio Technology and to develop (or have developed) as a Licensed Product, and including, for any such Selected MirnaRx Compound, any other MirnaRx Compound that has at least [***]% sequence homology with such Selected MirnaRx Compound.

1.49 "***Side Letter***" means that certain letter agreement between the Parties dated as of the Effective Date.

1.50 "***Sublicensee***" means a sublicensee, direct or indirect, of MirnaRx under MirnaRx's rights pursuant to Section 2.1.

1.51 "***Sublicense Fees***" shall have the meaning as ascribed to such term in Section 5.6.

1.52 "***Sublicensing Revenues***" means all consideration received by MirnaRx (or its Affiliate) from a Sublicensee in consideration of the grant of a sublicense under the Licensed Patents to such Sublicensee (which may include upfront fees, milestone payments, royalties and other similar fees), but excluding: (a) any amounts paid as reimbursement of research or development costs and expenses incurred by MirnaRx or its Affiliate (including past and ongoing costs and expenses) relating to Licensed Product; (b) direct reimbursement of patent prosecution or enforcement costs; (c) payments of a share of amounts recovered in enforcing patent or other intellectual property rights (except to the extent such share is calculated or treated as royalties under the terms of such sublicense); (d) transfer price payments for sale of compounds or products ([***] of actual fully-burdened cost of goods; (e) bona fide loans on commercial terms; and (f) any payments made to purchase equity in MirnaRx or a MirnaRx Affiliate at fair market value.

1.53 "***Technology Improvement***" means any improvements, enhancements or modifications to the Marina Bio Technology created solely. by Marina Bio within [***] of the Effective Date of the Agreement and which are not created pursuant to any agreement between Marina Bio and a Third Party, but excluding agreements with a contract research organization or consultant (or similar organization) that is contracted to improve the technology on behalf of Marina Bio and where Marina Bio owns or has exclusive license rights to the improvements made under such agreement.

1.54 "***Term***" means the term of this Agreement as set forth in Section 10.1.

1.55 "***Territory***" means the entire world.

1.56 "***Third Party***" means any entity or person other than Marina Bio or MirnaRx or an Affiliate of either of them.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

1.57 "***Third Party Claim***" means any claim, action, allegation, suit or legal proceeding brought by a Third Party against another entity or person.

1.58 "***Trademark***" means any trade name, service mark, logo or trademark (whether or not registered), together with all goodwill associated therewith, and any renewals, extensions or modifications thereto.

1.59 "***True-Up Payment***" shall have the meaning ascribed to such term in Section 5.6.

1.60 "***Valid Claim***" means an unexpired claim of an issued patent within the Licensed Patents that. has not been ruled to be unpatentable, invalid or unenforceable by a court or other authority in the country of the patent with competent jurisdiction, from which decision no appeal is taken or can be taken.

ARTICLE 2

LICENSES AND RELATED RIGHTS

2.1 **License Grants**. Marina Bio hereby grants to MirnaRx (and its Affiliates) (a) an exclusive royalty-bearing right and license, with full rights to grant sublicenses through multiple tiers, under the Licensed Patents and Licensed Know-How to research (however, for clarity, such research shall not be performed solely on the Licensed Technology), develop, make, have made, use, sell, offer for sale, import, export and otherwise Commercialize Licensed Products within the Field of Use in the Territory, and (b) a non-exclusive, worldwide, royalty-free rights and license, without any right to grant sublicenses, under the Licensed Patents and Licensed Know-How solely to make and conduct research on compositions containing MirnaRx Compound, *but excluding* any rights to conduct clinical development on or to sell, offer for sale or otherwise commercialize any such compositions.

2.2 **Sublicenses**. Any sublicenses granted to Third Party Sublicenses under the license rights granted in Section 2.1(a) shall be subject to the following terms: MirnaRx shall promptly notify Marina Bio of the granting of any sublicense hereunder including the name of the Sublicensee, financial terms relating to the grant of sublicense, and a general description of the .rights sublicensed, and each such sublicense shall be consistent with the terms of this Agreement.

2.3 Retained Rights. For clarity, Marina Bio retains all rights under the Licensed Technology, subject only to the license rights granted to MirnaRx under Section 2.1.

2.4 Limitations on License Rights. Except as granted under Section 2.1, no other rights to use or practice the Licensed Technology for any other use or purpose are granted to MirnaRx.

2.5 Licensed Know-How Transfer. As soon as is reasonably practicable after the Effective Date, Marina Bio will provide to MirnaRx copies of all the Licensed Know-How, including Manufacturing Processes, then in existence that is reasonably needed to research, develop, manufacture and/or Commercialize Licensed Products in the Field of Use, including full technology transfer to MirnaRx (and/or its contract manufacturer) of all Manufacturing

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Processes and other manufacturing information in the Licensed Know-How in MirnaRx's or its Affiliate's or contract manufacturer's possession as needed to manufacture the Marina Bio Technology formulation for use in Licensed Products. The Licensed Know-How will be provided to MirnaRx in written form, electronically if reasonably practicable and otherwise in hard copy documents, in a form reasonably acceptable to MirnaRx. Upon MirnaRx's request during the Term, Marina Bio shall provide reasonable consultation services (by teleconference or in-person during regular business hours) to assist MirnaRx in its understanding and/or use of the Licensed Technology as licensed under for the development of Licensed Product.. Such transfer and assistance shall be provided by Marina Bio without charge until the internal costs and expenses of providing such transfer and assistance equal to $[***]. Thereafter, MirnaRx shall reimburse Marina Bio for its internal costs and expenses at reasonable, agreed rates for the assistance expressly requested by MirnaRx.

2.6 Selection of Additional MirnaRx Compounds. At its sole discretion, MirnaRx may from time to time during the Term select one or more additional MirnaRx Compounds (which are not already a Selected MirnaRx Compound) to he combined with the Marina Bio Technology in a formulation to create a new Licensed Product, by providing Marina Bio written notice of such selection. Upon any such notice, and provided that such MirnaRx Compound is Available at the time notice is given, the MirnaRx Compound shall be deemed a new "Selected MirnaRx Compound", and MirnaRx shall then be obligated to pay the Selection Fee with respect to the additional Licensed Product containing such new Selected MirnaRx Compound as provided in Section 5.2. MirnaRx may make such selection at any time, [***]. Marina Bio agrees that, for a period of [***] after the Effective Date, it and its Affiliates [***]. During each [***] of the above [***] period, [***].

ARTICLE 3

PRODUCT DEVELOPMENT AND REGULATORY MATTERS

3.1 Development in Field of Use. MirnaRx shall have the sole rights to control and conduct, itself and/or through Affiliates or Sublicensees, and in its sole discretion except as provided below, the research and development of Licensed Products for commercialization and use in the Field of Use in the Territory. MirnaRx agrees to use Commercially Reasonable Efforts to conduct such research and development (pre-clinical and clinical) of Licensed Products as necessary to obtain Regulatory Approval of a Licensed Product in the Field of Use in the Major Markets and in such other countries in the Territory where MirnaRx determines it is commercially reasonable to do so. MirnaRx may satisfy the foregoing diligence obligation through activities of its Affiliates, subcontractors and/or Sublicensees. MirnaRx may subcontract all or part of the conduct of such development program to appropriately qualified third parties except as limited by Section 2.1(b).

3.2 Development Reporting. Every year within [***] after the anniversary of the Effective Date, MirnaRx shall provide to Marina Bio a written report setting out a reasonably detailed summary of progress and results of the development program on Licensed Product since the last report, including a summary of results and of the efforts taken in relation to the preparation submission of applications and other filings for Regulatory Approvals for the Licensed Product in the Field of Use. MirnaRx shall also provide prompt written notice to

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Marina Bio of (i) any Regulatory Approval received for any Licensed Product in any country and (ii) the anticipated commercial launch date for the Licensed Product in each country. The information contained in such reports and notices shall be deemed to be MirnaRx's Confidential Information.

3.3 Uncertainty In Development. With respect to the development of Licensed Products and efforts to obtain Regulatory Approval, each of the Parties agrees as follows:

(a) Drug product research and development is uncertain and has many risks and potential problems (including efficacy and toxicity issues); and that the development program on Licensed Products may produce no results, or unpredictable or inaccurate results, or results that cannot support Regulatory Approval or further development or commercial activity;

(b) Neither Party gives to the other any warranty or assurance that the development program for Licensed Products will have any particular result, that Regulatory Approval(s) will be obtained, or that such product development or Commercialization will be successful;

(c) For the avoidance of doubt, deviations from or changes to the development program on Licensed Product due to unexpected, unpredictable, inaccurate, or otherwise undesirable results (including results indicating toxicity issue or a lack of efficacy shall not be considered a failure of MirnaRx to meet its obligations hereunder and it shall not be deemed a material. breach to this Agreement per Section 10.2(c) of this Agreement.

3.4 Regulatory Matters Generally. MirnaRx (or its Affiliate or Sublicensee, as applicable) shall have the exclusive rights to manage and conduct all regulatory activities relating Licensed Products for use in the Field of Use in the Territory. MirnaRx may subcontract all or part of the conduct of such regulatory activities to appropriately qualified third parties.

3.5 Communications with Regulatory Authorities. From and after the Effective Date, MirnaRx shall be solely responsible for all contacts with all Regulatory Authorities with respect to Licensed Products within the Field of Use in the Territory. At MirnaRx's request, Marina Bio shall participate in such regulatory discussions, to the extent reasonably needed with respect to the Marina Bio Technology components of a Licensed Product, *provided that* Marina Bio's participation shall be limited to those matters for which MirnaRx expressly requests Marina Bio's comment or other involvement in such discussions. MirnaRx

shall reimburse Marina Bio for its reasonable expenses at reasonable, agreed rates that reflect the actual internal costs and Marina Bio's reasonable external expenses regarding travel, per diem and lodging, with respect to such requested participation.

3.6 Regulatory Filings. MirnaRx (or its Affiliate or Sublicensee) shall control and have sole responsibility for, at its expense and in its name, preparing and filing with the appropriate Regulatory Authorities of all Regulatory Documents, including all INDs and that are necessary or useful to conduct clinical studies of the Licensed Products, and all NDAs and other applications for Regulatory Approval to market and sell Licensed Products in the Field of Use in the Territory, and all amendments or supplements thereto. MirnaRx (or its Affiliate or Sublicensee, as applicable) shall own the entire and exclusive rights in all its Regulatory

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Documents and Regulatory Approvals. Marina Bio shall provide all reasonable assistance to MirnaRx as reasonably requested by MirnaRx in all such regulatory efforts, with respect to the CMC component of such regulatory filings or applications as relating to the Marina Bio Technology components of the applicable Licensed Product covered by such application. MirnaRx shall reimburse Marina Bio for its reasonable expenses in providing the above assistance, at agreed rates that reflect the actual internal costs of such assistance.

ARTICLE 4

COMMERCIALIZATION; MANUFACTURING

4.1 Commercialization Rights in Yield of Use. MirnaRx shall have the sole rights, itself and/or through Affiliates or Sublicensees (and their respective distributors) to Commercialize and otherwise exploit Licensed Products developed by MirnaRx or its Affiliates . (or Sublicensee) for all uses in the Field of Use in the Territory. MirnaRx agrees to use Commercially Reasonable Efforts to conduct such Commercialization activities of a Licensed Product in the Field of Use in the Major Markets and in such other countries in the Territory where MirnaRx determines it is commercially reasonable to do so. MirnaRx may satisfy the foregoing diligence obligation through activities of its Affiliates, subcontractors and/or Sublicensees. MirnaRx (and its Affiliates and Sublicensees) shall have sole control over all decisions regarding Commercialization, including pricing and marketing strategies.

4.2 Commercialization Reporting. Every year within [***] of the anniversary of the Effective Date after Regulatory Approval is granted, MirnaRx shall provide to Marina Bio written report setting out a reasonably detailed summary of efforts and progress of the Commercialization program on Licensed Product in the Field of Use since the last report, including a summary of marketing results.

4.3 Manufacturing. MirnaRx (and/or its Affiliate or Sublicensee) shall have the sole responsibility for conducting all manufacturing process development and scale-up, as needed to have an appropriate manufacturing process for Licensed Products sufficient to meet all expected demand for Licensed Products. Marina Bio shall provide all reasonable assistance to MirnaRx as reasonably requested by MirnaRx in such manufacturing scale-up efforts with respect to the Marina Bio Technology components of the applicable Licensed Product. MirnaRx shall reimburse Marina Bio for its reasonable expenses in providing the above assistance, at agreed rates that reflect the actual internal costs of such assistance.

ARTICLE 5

CONSIDERATION; PAYMENTS; REPORTS

5.1 Upfront License Fee. In part consideration of the license rights granted by Marina Bio under this Agreement, MirnaRx shall pay Marina Bio an upfront license fee of $[***], to be paid within [***] of the Effective Date but no later than [***]. For the avoidance of doubt, this upfront license fee includes designation of miR-34 as a Selected MirnaRx Compound (as provided in Section 1.48(a)).

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5.2 Selection Fee Payments. In part consideration of the license rights granted by Marina Bio under this Agreement, in the event that MirnaRx selects, under Section 2,6,, a new MirnaRx Compound (which is not then a Selected MirnaRx Compound) as a Selected MirnaRx Compound and develops such new Selected MirnaRx Compound as an additional Licensed Product, then MirnaRx shall pay Marina Bio an additional compound selection fee of $[***], such amount to be paid as follows: (a) with respect to any Option Compound that is selected by MirnaRx in its discretion as a Selected MirnaRx Compound in accordance with Section 2.6, (i) $[***] of such amount shall be paid within [***] of the date that MirnaRx selects the Selected MirnaRx Compound under Section 2.6, and (ii) the balance ($[***]) will be paid [***], and (b) with respect to any Selected MirnaRx Compounds that are not Option Compounds when selected by MirnaRx under Section 2.6, the total amount of $[***] for such Selected MirnaRx Compound shall be paid within [***] of the date that MirnaRx selects the Selected MirnaRx Compound under Section 2.6. All such selection fees shall be in addition to any amounts due based on Sublicensing Revenue received by MirnaRx (if any) for sublicensing a Licensed Product containing the applicable Selected MirnaRx Compound, as set forth in Section 5.6 below.

5.3 Milestone Payments.

(a) In part consideration of the license rights granted by Marina Bio under this Agreement. MirnaRx shall pay to Marina Bio a milestone payment upon first achievement by MirnaRx (independent of work done by or in collaboration with a Sublicensee) of the applicable milestone event set forth in the table below, such payments to be in the listed amounts for the applicable milestone event:

Milestone Event	Milestone Payment
(i) For each Licensed Product:	
(1) [***]	$ [***]
(2) [***]	$ [***]
(3) [***]	$ [***]
(4) [***]	$ [***]
(ii) For each Additional. Indication for the Licensed Product, up to total of [***] Additional Indications:	
(1) [***]	$ [***]

For clarity each of the above milestone payments shall be paid only once for a particular Licensed Product, regardless if any such Milestone Event is achieved more than once, [***]. Further, if a particular Licensed Product achieves a particular Milestone Event under subclause (i) of the above table without

having achieved a previous Milestone Event such

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subclause (1), then such previous Milestone Event shall be deemed also achieved, and the Milestone Payment associated with such Milestone Event shall then be paid with the achievement of the subsequent Milestone Event. For illustrative purposes only, if the [***] Milestone Event as set forth in (i)(3) in the table above is not achieved for a Licensed. Product but the [***] Milestone Event as set forth in (i)(4) above is achieved for such Licensed Product, then the Milestone Payment for achievement of the Milestone Event in clause (i)(3) ($[***]) will be paid when the Milestone Payment for (i)(4) is paid. The total amount of milestone payments payable for a particular Licensed Product under the above shall not, in any event, exceed $6,000,000 under subclause (i) of the above table and $10,000,000 in total. For additional clarity, if MirnaRx. (or its Affiliate) enters into a sublicense Agreement under which the applicable Sublicensee is granted sublicense rights to Commercialize a Licensed Product, then achievement of any of the above Milestone Events by such Sublicensee, or by MirnaRx or its Affiliate working in collaboration with such Sublicensee under the sublicense agreement, shall not create a Milestone Payment obligation, but instead MirnaRx shall have the obligation to share Sublicense Revenues received under such sublicense agreement as provided in Section 5.6 below.

(b) MirnaRx shall promptly notify Marina Bio of the achievement of any Milestone Event for each Licensed Product. All Milestone Payments under subsection (a) above are non-refundable and. non-creditable, and shall be due within [***] of achievement of the applicable Milestone Event.

5.4 Royalties. In part consideration of the license rights granted by Marina Bio under this Agreement, and subject to the provisions of Sections 5.5, MirnaRx shall pay royalties to Marina Bio on sales by MirnaRx or any of its Affiliates of Licensed Products during the Royalty Term, as follows:

(a) For sales of License Product in country(ies) where such sale would infringe, absent the license granted in Section 2.1, a Valid Claim of an issued Licensed Patent, MirnaRx shall pay to Marina Bio royalties equal to [***]% of the Net Sales revenue recognized by MirnaRx or any of its Affiliates from such sales;

(b) For sales of License Product in country(ies) where either (i) there is no Valid Claim in an issued Licensed Patent that would be infringed, absent the license granted in Section 2.1, by such sale of the Licensed Product, or (b) there are sales of Generic Products during the same royalty period as such sales of Licensed Product, then MirnaRx shall pay to Marina Bio royalties equal to [***]% of the Net Sales revenue recognized by MirnaRx or any of its Affiliates from such Licensed Product sales.

5.5 Anti-Stacking Provisions. If MirnaRx, or its Affiliate owes to one or more Third Parties, under license agreement(s) granting .MirnaRx (or its Affiliate or Sublicensee) license rights covering patents (or other intellectual property rights) that are needed to make, use, sell or otherwise Commercialize the Licensed Technology as contained in the Licensed Product, royalties or similar payments on sales of such Licensed Products, then MirnaRx may reduce the royalties owed to Marina Bio under Section 5.4 based on such sales of Licensed Product by [***]% of the royalty or similar payments actually paid to such Third Parties, provided that MirnaRx shall not reduce any particular royalty payment to Marina Bio by more than [***]% of

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the amount otherwise owed under the royalty provisions of Section 5.4 for the applicable royalty period.

5.6 Sublicense Fees. In part consideration of the license rights granted by Marina Bio under this Agreement and the right to sublicense such licenses. MirnaRx shall pay to Marina Bio an amount ("***Sublicense Fees***") equal to a percentage of any Sublicensing Revenue received by MirnaRx (or its Affiliate) from any Sublicensee based on the grant to such Sublicensee of sublicense rights under MirnaRx's license rights under the Licensed Patents. Such percentage shall be determined based on the development stage of the applicable Licensed Product (that is covered by the sublicense) at the time that the particular sublicense agreement is executed by the parties thereto, as follows:

[***]	**Percentage of Sublicense Revenue**
[***]	[***]%
[***]	[***]%
[***]	[***]%
[***]	[***]%
[***]	[***]%

If, as to a particular Licensed Product being developed by a Sublicensee, such Sublicensee first achieves, with respect to such Licensed Product, one of the Milestone Events in the milestone table in Section 5.3(a) above, then in no event will the cumulative amount (the "***Cumulative Sublicense Fees***", as of the applicable date) of Sublicense Fees paid to Marina Bio by MirnaRx. under this Section 5.6, by the date [***] after the date that such Milestone Event is achieved, with. respect to Sublicense Revenues received by MirnaRx from such Sublicensee, be less than the cumulative amount (the "***Milestone Payment Sum***", as of the applicable date) of the Milestone Payments that would have been due under Section 5.3(a) by such date, for all Milestone Events achieved by such Sublicensee (as of such date), had MirnaRx achieved such Milestone Events. If, as to a Sublicensee that first achieves a particular Milestone Event for the applicable Licensed Product sublicensed to such Sublicensee, the Cumulative Sublicense Fees paid by MirnaRx to Marina Bio based on Sublicense Revenues received from such Sublicensee, by the date that is [***] after the date when such Milestone Event is achieved, is less than the Milestone Payment Sum effective as of such date, then MirnaRx will by such date also pay to Marina Bio the amount of such difference (such amount, the "***True-Up Payment***" as to the applicable Milestone Event achieved by such Sublicensee). An example of the calculation of such amounts and the determination of such difference (if any) is given in Appendix B of this Agreement. For clarity, any such True-Up Payment shall be deemed a Sublicensee Fee payment for all purposes of this Agreement. Further, if in the sublicense agreement between MirnaRx and a particular Sublicensee, the definition of "Major Markets" (or equivalent definition) is different from the definition in Section 1.27 of this Agreement, then the definition in such sublicense agreement will be used with respect to the achievement of the Milestone Event in subclause (i)(4) of the milestone table in Section 5.3(a) above, for the purpose of determining

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whether any "True-Up Payment" is owed by MirnaRx based on the Sublicensee achieving Regulatory Approval of the applicable Licensed Product in a Major Market.

5.7 Payment of Royalty and Sublicense Fee Obligations. The royalty obligation under Section 5.4 shall accrue upon the sales of a Licensed Product in each particular country in the Territory, commencing upon [***], and such obligation shall end upon the expiration of the Royalty Term applicable to such Licensed Product in such country. All such royalty payments are .non-refundable and non-creditable and shall be due within [***] of the end of each calendar quarter and are payable in immediately available funds. The Sublicense Fees owed under Section 5.6 shall be paid, with respect to particular Sublicense Revenue received by MirnaRx., within [***] of MirnaRx's receipt of the applicable revenues, and are payable in immediately available funds. MirnaRx shall notify Marina Bio in writing promptly upon the first commercial sale of Licensed Product in each country and thereafter MirnaRx shall furnish Marina Bio with a written report (the "***Royalties Report***") for each completed [***] showing, on a country-by-country basis, according to the volume of units of Licensed Product sold in each such country (by SKU) during the reporting period (whether Product is sold by MirnaRx or its Affiliates or Sublicensees): (a) the gross invoiced sales of the Product sold in each country during the reporting period, and the amounts deducted therefrom to determine Net Sales from such gross invoiced sales; (b) the royalties payable in dollars, if any, which shall have accrued hereunder based upon Net Revenues from sales of Product; and (c) the withholding taxes, if any, required by Applicable Law to be deducted in respect of such sales (provided that, as to sales by Sublicensees, MirnaRx shall report only the net sales numbers (using the definition for such term in the applicable sublicense agreement) as reported by the Sublicensee, if such Sublicensee does not report gross invoiced sales numbers). With respect to sales of Licensed Product invoiced in US dollars, the gross invoiced sales, Net Revenues and royalties payable shall be expressed in the Royalties Report in US Dollars. With respect to sales of Licensed Product invoiced in a currency other than US dollars, the gross invoiced sales, Net Sales and royalties payable shall be expressed in the Royalties Report in the domestic currency of the party making the sale as well as in the US dollar equivalent of the Royalty payable and the exchange rate used in determining the amount of US dollars. The US dollar equivalent shall be calculated on a calendar-month basis using the average monthly interbank rate listed in the Wall Street Journal.

5.8 Currency Restrictions. If at any time legal restrictions in any country in the world prevent the prompt remittance of any payments with respect to sales in that country, MirnaRx shall have the right anti option upon written notice to Marina Bio to make such payments by depositing the amount thereof in local currency to Marina Bio's account (or such other designated nominee by Marina Bin) in a bank or depository in such country.

5.9 Taxes. In the event that laws, rules or regulations require MirnaRx to withhold taxes with respect to any payment to be made by MirnaRx to Marina Bio pursuant to this Agreement, MirnaRx will notify Marina Bio of such withholding requirement prior to making the payment to Marina Bio and shall make such withholding from such payment of the required amount of withholding and shall make the required tax payment to the appropriate tax authority, and provide such assistance to Marina Bio, including the provision of such documentation as may be required by a tax authority, as may be reasonably necessary in Marina Bio's efforts to claim an exemption from or reduction of such taxes.

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5.10 Late Payments. All fees and royalties due under this Agreement not received within the period due shall bear interest from the date they are due until the date they are paid at the rate of [***] percent ([***]%) per annum or the maximum rate permitted by law, whichever is less.

5.11 Audit. MirnaRx and its Affiliates shall keep complete and accurate records of the underlying revenue and expense data relating to the calculations of Net Sales, Sublicensee Revenues and payments required under this Agreement. Marina Bio shall have the right, at its own expense and no more than [***], to have an independent, certified public accountant, selected by Marina Bio and reasonably acceptable to MirnaRx, review all such records upon reasonable notice and during regular business hours and under obligations of strict confidence, for the sole purpose of verifying the basis and accuracy of payments required and made under this Agreement within the prior [***] period. No calendar quarter may be audited more than one time. MirnaRx shall receive a copy of each audit report promptly from Marina Bio. Should the inspection lead to the discovery of a discrepancy to Marina Bio's detriment, MirnaRx shall pay the amount of the discrepancy in Marina Bio's favor within [***] after being notified thereof. Marina Bio shall pay the full cost of the inspection unless the discrepancy is greater than [***] percent ([***]%), in which case MirnaRx shall pay to Marina Bio the actual cost charged by such accountant for such inspection. If such audit shows a discrepancy in MirnaRx's favor, then MirnaRx may credit the amount of such discrepancy against subsequent amounts owed to Marina Bio, or if no further amounts are owed under this Agreement, then Marina Bio shall pay MirnaRx the amount of the discrepancy within [***] after being notified thereof.

ARTICLE 6

INTELLECTUAL PROPERTY

6.1 Intellectual Property Ownership. Any information, know-how, data, results, and inventions, and any associated intellectual property, that is made, discovered, created, invented or generated by MirnaRx or its Affiliate in any activities or work under this Agreement shall be owned by MirnaRx.

6.2 Grant-Back License. Subject to the terms of the Agreement, MirnaRx hereby grants to Marina Bio (and its Affiliates) the [***] license, with the right to sublicense (subject to the limitation below) in the Territory under the Improvement Patent Claims solely to use and practice the Improvement Patent Claims in connection with the manufacture. use or sale of the Licensed Technology. In no event shall Marina Bio or its Affiliates or sublicensees) grant, or have any rights to grant, any sublicense under the foregoing license that is separate from a license (to the applicable sublicensee) under Marina Bio Technology. Marina Bio shall pay to MirnaRx a royalty of [***]% of the net sales of any products sold by Marina Bio or its Affiliate or sublicensee where the manufacture, use or sale of such product is claimed by a valid claim in the issued Improvement Patent Claims (where the terms "net sales" and "valid claim" have the same meanings as Net Sales and Valid Claims applied *mutatis mutandis* to the situation involving such product sold by Marina Bio (or its Affiliate or sublicensee) and Improvement Patent Claim).

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6.3 Prosecution and Maintenance. Marina Bio shall, at its expense, file, prosecute, defend and maintain, including conducting re-examination, reissue, opposition and interference proceedings (and any other similar patent proceedings) regarding, the Licensed Patents before all patent authorities (collectively, "***Prosecution***"). Marina Bio shall keep MirnaRx reasonably informed of such Prosecution efforts and results. Marina Bio shall not abandon any patent rights in the Licensed Patents without first notifying MirnaRx in writing at least [***] prior to any such abandonment. If Marina Bio intends to abandon any such rights of Licensed Patent, or does not conduct the Prosecution of any claim or patent application or patent within the Licensed Patents in any specific country, after MirnaRx's request, then MirnaRx shall have the right, on written notice to Marina Bio, to undertake the Prosecution of such claims, applications or patents at MirnaRx's sole cost and expense, and in such case Marina Bio shall do all things to provide MirnaRx with the right and opportunity to conduct the Prosecution of such claim or patent application or patent.

6.4 Infringement by Third Parties. If requested by MirnaRx, Marina Bio shall use Commercially Reasonable Efforts to enforce the Licensed Patents against infringers that are causing a material negative impact on MirnaRx (or its Affiliate or Sublicensee) in the market for Licensed Product due to the infringement of the Licensed Patents. Marina Bio shall keep MirnaRx fully informed of the progress and results of any such enforcement action. Any recoveries in any such enforcement actions against an infringement brought under this Section 6.2 shall be used first to reimburse Marina Bio's out-of-pocket costs and expenses (including attorneys' fees) for such action and any remainder shall be shared equally by the licensees of the Licensed Patents affected by the infringement action. Marina Bio shall not enter into any settlement of any action under this Section 6.2 that materially negatively affects MirnaRx's (or its Affiliate's or Sublicensee's) rights or interests under this Agreement without MirnaRx's written consent, which consent shall not be unreasonably withheld or delayed. If a third party is infringing a Licensed Patent by making, using or selling a Licensed .Product (a "***Field Infringement***"), and Marina Bio does not enforce the Licensed Patent against such Field Infringement within [***] after request by MirnaRx, or ceases such enforcement without causing the Field Infringement to terminate, then thereafter MirnaRx shall have the right to enforce the applicable Licensed Patents against such Field Infringement, at its expense, and shall keep Marina Bio reasonably informed of such enforcement: In any such enforcement by MirnaRx, Marina Bio agrees to join the action as a party plaintiff (at MirnaRx's expense) if required for MirnaRx to have standing to pursue the action and to cooperate and provide all reasonable assistance in MirnaRx's enforcement.

6.5 Defense of Third Party Actions. Each Party shall promptly notify the other Party upon receiving written notice of any potential infringement, or any Third Party claim or action against Marina Bio or MirnaRx or any of their Affiliates or Sublicensees for possible infringement, of a Third Party patent right resulting from the practice or use by MirnaRx (or its Affiliate or Sublicensee) of the Licensed Technology under this Agreement. Each Party shall be responsible for defending, and shall control the defense of, any such action brought against such Party.

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ARTICLE 7

REPRESENTATIONS, WARRANTIES AND COVENANTS

7.1 Representations and Warranties of Marina Bio. As of the Effective Date, Marina Bio hereby represents and warrants to MirnaRx as follows:

(a) Corporate Existence and Power. Marina Bio is a corporation duly organized, validly existing and. in good standing under the laws of the State of Delaware, and has full corporate power and authority and the legal right to own and operate its property and assets and to carry on its business as it is now being conducted.

(b) Authority and Binding Agreement. Marina Bio has the corporate power and authority and the legal right to enter into this Agreement and perform its obligations hereunder. Marina Bio has taken all necessary corporate action on its part required to authorize the execution and delivery of the Agreement and the performance of its obligations hereunder. The Agreement has been duly executed and delivered by Marina Bio and constitutes a legal, valid and binding obligation of Marina Bio that is enforceable against it in accordance with its terms.

(c) No Conflict. The execution, delivery. and performance of this Agreement by Marina Bio does not conflict with, and will not result in a breach of, any material agreement, instrument or understanding, oral or written, to which it is a party or by which it may be bound, nor violate any material law or regulation of any court, governmental body or administrative or other agency having jurisdiction over it. Marina Bio hereby covenants that it and its Affiliates shall not enter into any agreement that will conflict with its obligations and covenants in this Agreement or prevent or interfere with its performance of such obligations.

(d) IP Rights. Marina Bio owns all the Licensed Technology has the full legal rights and authority to grant the licenses and rights under the Licensed Technology granted under this Agreement and has not assigned, transferred, conveyed or licensed its right, title and interest in the Licensed Technology in any manner inconsistent with such license grant or the other terms of this Agreement. There is no pending litigation or, to the best of Marina Bio's knowledge, written threat of litigation that has been received by Marina Bio (and has not been resolved by taking a license or otherwise), which alleges that Marina Bio's activities with respect to the Licensed Patents or Licensed Products have infringed, or misappropriated any of the intellectual property rights of any Third Party. To the best of Marina Bio's knowledge, the practice of the Licensed Technology as contemplated by this Agreement does not infringe any patent rights, or misappropriate any other intellectual property, owned by a Third Party.

(e) Disclaimer. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH ABOVE IN THIS SECTION 7.1, MARINA BIO MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, OF ANY KIND, INCLUDING AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR USE OR NON-INFRINGEMENT OF THE LICENSED TECHNOLOGY OR THE LICENSED PRODUCTS.

7.2 Representations and Warranties of MirnaRx. As of the Effective Date, MirnaRx hereby represents and warrants to Marina Bio as follows:

(a) Corporate Existence and Power. MirnaRx is a corporation duly organized, validly existing and in good standing under the laws of Delaware, and has full corporate power and authority and the legal right to own and operate its property and assets and to carry on its business as it is now being conducted.

(b) Authority and Binding Agreement. MirnaRx has the corporate power and authority and the legal right to enter into this Agreement and perform its obligations hereunder. MirnaRx has taken all necessary corporate action on its part required to authorize the execution and delivery of the

Agreement and the performance of its obligations hereunder. The Agreement has been duly executed and delivered by MirnaRx and constitutes a legal, valid and binding obligation of MirnaRx that is enforceable against it in accordance with its terms.

(c) No Conflict. The execution, delivery and performance of this Agreement by MirnaRx does not conflict with, and would not result in a breach of, any material agreement, instrument or understanding, oral or written, to which it is a party or by which it may be bound, nor violate any material law or regulation of any court, governmental body or administrative or other agency having jurisdiction over it.

(d) EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH ABOVE IN THIS SECTION 7.2, MIRNARX MAKES NO OTHER .REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, OF ANY KIND, INCLUDING AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR USE OR NON-INFRINGEMENT, OR THAT THE DEVELOPMENT OR COMMERCIALIZATION OF ANY LICENSED PRODUCT WILL BE SUCCESSFUL.

ARTICLE 8

INDEMNIFICATION

8.1 Indemnification by Marina Bio. Marina Bio hereby agrees to defend, hold harmless and indemnify MirnaRx and its Affiliates, and each of their respective officers, directors and employees (collectively, the "***MirnaRx Indemnitees***"), from and against any and all Losses arising out of any Third Party Claim based upon or resulting from: (i) any of Marina Bio's representations and warranties set forth in Section 7.1 of this Agreement being untrue in any material respect when made; (ii) Marina Bio's failure to perform, in any material respect, any covenant or obligation of Marina Bio set forth in this Agreement; and (iii) Marina Bio's gross negligence or willful misconduct; except, in each case, to the extent any such Losses result from the gross negligence or willful misconduct of MirnaRx Indemnitees or from the breach of any representation, or warranty or obligation under this Agreement by MirnaRx or its Affiliate.

8.2 Indemnification by MirnaRx. MirnaRx hereby agrees to defend, hold harmless and indemnify Marina Bio and its Affiliates, and each of their respective officers, directors and employees (collectively, the "***Marina Bio Indemnitees***"), from and against any and all Losses arising out of any Third Party Claim based upon or resulting from: (1) any of MirnaRx's

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representations and warranties set forth in Section 7.2 of this Agreement being untrue in any material respect when made; (ii) MirnaRx's or its Affiliate's failure to perform, in any material respect, any covenant or obligation of MirnaRx set forth in this Agreement; (iii) the exercise or practice by MirnaRx, its Affiliates or Sublicensees of the licenses granted to MirnaRx under Sections 2.1 (*excluding* any such Claim that alleges that the exercise or practice of the Licensed Technology infringes a patent or misappropriates- other intellectual property of the Third Party); or (iv) the development, manufacture or Commercialization of any Licensed Product by or for MirnaRx, its Affiliates or Sublicensees; except. in each ease, to the extent any such Losses result from the gross negligence or willful misconduct of Marina Bio Indemnitees or from the breach of any representation or warranty or covenant or obligation under this Agreement by Marina Bio.

8.3 Indemnification Procedures. Each Party (Marina Bio on behalf of Marina Bio Indemnitees, or MirnaRx on behalf of MirnaRx Indemnitees) will promptly notify the other Party when it becomes aware of a Claim for which indemnification may be sought hereunder. To be eligible to be indemnified for a Claim, a Person seeking indemnification (the "***indemnified Party***") shall (i) provide the Party required to indemnify such Person (the "***Indemnifying Party***") with prompt written notice of the Claim giving rise to the indemnification obligation under this Article 8, provided that, the failure to provide such prompt notice shall not relieve the Indemnifying Party of any of its obligations under this Article 8 except to the extent the Indemnifying Party is actually prejudiced thereby; (ii) provide the Indemnifying Party with the exclusive ability to defend (with the reasonable cooperation of the Indemnified Party) against the Claim; and (iii) not settle, admit or materially prejudice the Claim, without the Indemnifying Party's prior written consent. The Indemnified Party shall reasonably cooperate with the Indemnifying Party, at the Indemnifying Party's expense, in the defense of any Claim. Notwithstanding the foregoing, the Indemnified Party shall have the right to participate in and have its own counsel participate in any action or proceeding for which the Indemnified Party seeks to be indemnified by the Indemnifying Party. Such participation shall be at the Indemnified Party's expense, unless (i) the Indemnifying Party and the Indemnified Party shall have mutually agreed to the retention of such counsel or (ii) the named parties to any such proceeding (including any impleaded parties) include both the Indemnifying Party and the Indemnified Party and representation of both Parties by the same counsel would be inappropriate due to actual or potential differing interests between them. The Indemnifying Party's obligations under Section 8.1 or 8.2, as the case may be, shall not apply to the extent of the Indemnified Party's failure to take reasonable action to mitigate any Losses. The :Indemnifying Party shall not settle or compromise or consent to the entry of any judgment with respect to any Claim, without the prior written consent of the indemnified Party, which will not be unreasonably withheld or delayed.

8.4 Insurance. MirnaRx shall, at its own expense, procure and maintain during the Term and for a period of [***] thereafter, insurance policy/policies, including product liability insurance, adequate to cover its obligations hereunder and which are consistent with normal business practices of prudent companies similarly situated.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

ARTICLE 9

CONFIDENTIALITY

9.1 Treatment of Confidential Information. The Parties agree that during the Term, and for a period of [***] after this Agreement expires or terminates, a Party receiving Confidential Information of the other Party shall (i) maintain in confidence such Confidential information; (ii) not disclose such Confidential Information to any Third Party without prior written consent of the disclosing Party, except as otherwise permitted in this Article 9; and (iii) not use such Confidential Information for any purpose other than the performance of or exercise of its rights under this Agreement.

9.2 Authorized Disclosure.

(a) If, based upon the advice of legal counsel skilled in the subject matter, a Party is required to disclose specific Confidential Information of the other Party to comply with an applicable law, regulation, legal process, or order of a government authority or court of competent jurisdiction, the Party may disclose such Confidential Information only to the entity or person required to receive such disclosure; provided, however, that the Party required to disclose such Confidential Information shall (a) to the extent permitted by such law, regulation, process, order or rules, first have given prompt (but in no event less than five (5)

business days) advance notice to such other Party to enable it to seek any available exemptions from or limitations on such disclosure requirement and shall reasonably cooperate in such efforts by the other Party, (b) furnish only the portion of the Confidential Information which is legally required to be disclosed; (c) use all reasonable efforts to secure confidential protection of such Confidential Information, and (d) continue to perform its obligations of confidentiality and non-use set out in this Article 9.

(b) MirnaRx (and its Affiliates and Sublicensees) may disclose Confidential Information of Marina Bio to Regulatory Authorities to the extent such disclosure is reasonably necessary in regulatory filings required for the development and/or commercialization of Licensed Products. In addition, each Party may disclose Confidential Information of the other Party to the extent such disclosure is reasonably necessary in the following instances: filing or prosecuting, patents as permitted by this Agreement; and disclosure to Affiliates and Sublicensees and potential Sublicensees or other similar commercial partners, who need to know such information for the development, manufacture and commercialization of Licensed Products, to bankers, lawyers, accountants, agents or other Third Parties in connection with due diligence or similar investigations, and to potential Third Party investors in confidential financing documents or potential acquirers or merger partners in confidence pursuant to due diligence; provided that any such Sublicensee, licensee, contractor, employee, consultant, banker, lawyer, accountant, agent or Third Party is bound by obligations of confidentiality and non-use at least as restrictive as those set forth herein. In the case of each disclosure, the Party making such disclosure shall use reasonable efforts to obtain confidential treatment of any such disclosure, and shall not disclose Confidential Information of the other Party other than is reasonably necessary.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

9.3 Publicity; Terms of Agreement. The Parties shall treat the existence and material terms of this Agreement as confidential and shall not disclose such information to Third Parties without the prior written consent of the other Party or except as provided in Section 9.2 (treating such information as Confidential Information for purposes of Section 9.2) or as provided below. The Parties agree that upon execution of this Agreement or shortly thereafter, the Parties shall issue a joint press release, such press release attached hereto as Appendix C. Except for such press release or as otherwise required by applicable law or applicable stock exchange requirements, neither Marina Bio nor MirnaRx shall issue or cause the publication of any other press release or public announcement with respect to the transactions contemplated by this Agreement without the express prior approval of the other Party, which approval shall not be unreasonably withheld or delayed; provided that, each of Marina Bio and MirnaRx may make any public statement in response to questions by the press, analysts, investors or those attending industry conferences or financial analyst calls, or issue press releases, so long as any such public statement or press release is not inconsistent with prior public disclosures or public statements approved by the other Party pursuant to this Section 9.3 and which do not reveal non-public information about the other Party. With respect to complying with the disclosure requirements of the Securities and Exchange Commission or other regulatory agencies, in connection with any required filing of this Agreement with such agency, the Parties shall consult with one another concerning which terms of this Agreement shall be requested to be redacted in any public disclosure of the Agreement by the agency, and each Party shall seek confidential treatment by the agency in public disclosure of the Agreement by the agency for all sensitive commercial, financial and technical information, including the definitions of Licensed Products and Field of Use, and any dollar amounts set forth herein. Marina Bio agrees that the Side Letter contains the highly confidential information of MirnaRx and such information shall be deemed and treated as the Confidential Information of MirnaRx, and Marina Bio shall not disclose the contents of the Side Letter without MirnaRx's prior written consent or use such information for any purpose other than performing under this Agreement, *except* to the extent that specific information in such contents are within the exceptions in Section 1.9(a)-(d).

9.4 Injunctive Relief. Given the nature of the Confidential information and the competitive damage that would result to a Party upon unauthorized disclosure, use or transfer of its Confidential Information to any Third Party, the Parties agree that monetary damages may not be a sufficient remedy for any breach of this .Article 9. In addition to all other remedies, a Party shall be entitled to seek specific performance and injunctive and other equitable relief as a remedy for any breach or threatened breach of this Article 9.

ARTICLE 10

TERM AND TERMINATION

10.1 Term. The term of this Agreement, as to a particular Licensed Product in a particular country, shall expire (on a country-by-country basis) upon the earlier of: (i) the expiration of the Royalty Term for such Licensed Product in such country, or (ii) the end of calendar quarter in which sales in such country of Generic Products exceed [***]% (on a "per unit" basis) of the sales of the Licensed Product in such country. Upon expiration of the Royalty Term with respect to a Licensed Product in a particular country, then the licenses granted in Section 2.1 for such Licensed Product in such country shall become non-exclusive, fully paid up

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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and irrevocable, and shall survive any expiration or termination of this Agreement. This Agreement shall expire in its entirety upon the expiration of the last Royalty Term for any Licensed Product with respect to which MirnaRx has a license under this Agreement, unless earlier terminated pursuant to this Article 10.

10.2 Termination.

(a) Termination for Convenience. MirnaRx shall have the right to terminate this Agreement for convenience by giving sixty (60) days prior written notice to Marina Bio, *provided that* no such termination shall be effective sooner than the date that is six (6) months after the Effective Date.

(b) Termination for Bankruptcy/Insolvency. A Party- may immediately terminate this Agreement on written notice in the event (each, a "***Financial Event***") any of the following occurs with respect to the other Party (the "***Bankrupt Party***"): (a) such Bankrupt Party files a petition in bankruptcy or makes a general assignment for the benefit of creditors or otherwise acknowledges in writing insolvency, or is adjudged bankrupt, and such Bankrupt Party (i) fails to assume this Agreement in any such bankruptcy proceeding within thirty (30) days after filing or (ii) assumes and assigns this Agreement to a Third Party; (b) such Bankrupt Party goes into or is placed in a process of complete liquidation; (c) a trustee or receiver is appointed for any substantial portion of such Bankrupt Party's business and such trustee or receiver is not discharged within sixty (60) days after appointment; (d) any case or proceeding shall have been commenced or other action taken against such Bankrupt Party in bankruptcy or seeking liquidation; reorganization, dissolution, a winding-up arrangement, composition or readjustment of its debts or any other relief under any bankruptcy, insolvency, reorganization or similar act or law of any jurisdiction now or hereafter in effect and is not dismissed or converted into a voluntary proceeding governed by clause (a) above within sixty (60) days after filing; or (e) there shall

have been issued a warrant of attachment, execution, distraint or similar process against any substantial part of the property of such Bankrupt Party and such event shall have continued for a period of sixty (60) days and none of the following has occurred: (i) it is dismissed, (ii) it is bonded in a manner reasonably satisfactory to the other Party, or (iii) it is discharged.

(c) Termination for MirnaRx Default. Upon any Default by MirnaRx under this Agreement, Marina Bio may notify MirnaRx of such Default and require that MirnaRx cure such Default, which cure period shall be not shorter than thirty (30) days of Marina Bio's notice for any Default of a payment obligation under this Agreement, or ninety (90) days of Marina Bin's notice for any other Default. In the event MirnaRx shall not have cured the Default by the end of the applicable cure period, Marina Bio may terminate this Agreement immediately upon written notice to MirnaRx. Notwithstanding the foregoing cure period, non-payment of the upfront license fee set forth in Section 5.1 by [***], shall automatically and immediately terminate this Agreement.

(d) Termination for Marina Bio Default. Upon any Default by Marina Bio under this Agreement, MirnaRx may notify Marina Bio in writing of such Default and require that Marina Bio cure such Default within ninety (90) days of MirnaRx's notice. In the event Marina Bio shall not have cured the Default by the end of the cure period, MirnaRx may terminate this Agreement immediately upon written notice to Marina Bio.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

10.3 Effects of Termination. Upon termination of this Agreement pursuant to Section 10.2: (a) all licenses granted hereunder to MirnaRx shall revert to Marina Bio; (b) sublicenses granted by MirnaRx under the rights or licenses granted to MirnaRx under this Agreement shall survive such termination, *provided that* the applicable Sublicensees are not in material breach of such sublicense agreements, and shall become direct licenses with Marina Bio *except that* Marina Bio shall not have any obligations under any such sublicense agreements that are greater than the obligations of Marina Bio under this Agreement; and (c) MirnaRx (and its Affiliates) shall immediately cease all development and Commercialization of any Licensed Products that contain Licensed Know-How that is Confidential Information of Marina Bio and/or are claimed by a Valid Claim, and shall return to Marina Bio all physical manifestations of the Licensed Technology and Marina Bio Confidential Information.

10.4 Survival. The following provisions shall survive any expiration or termination of this Agreement: Articles [***] and [***], and. Sections [***] and [***] and the applicable Sections of Article 1 (as needed to apply to the foregoing surviving Sections and Articles). Termination of this Agreement shall not relieve the Parties of any liability which accrued hereunder prior to the effective date of such termination nor preclude either Party from pursuing all rights and remedies it may have hereunder or at law or in equity with respect to any Default of this Agreement nor prejudice either Party's right to obtain performance of any obligation.

ARTICLE 11

DISPUTE RESOLUTION

11.1 Disputes. In the event that any issue, controversy or claim between the Parties arises out of, relating to or in connection with, any provision of this Agreement, or the rights or obligations of the Parties hereunder (a "***Dispute***"), the Parties shall try to settle such Dispute and their differences amicably between themselves. Either Party may initiate such informal dispute resolution by sending written notice of the Dispute to the other Party. and within [***] after such notice appropriate representatives of the Parties shall meet for attempted resolution by good faith negotiations. If such representatives are unable to resolve promptly such Dispute, it shall be referred to the Executive Officers for discussion and resolution. If such personnel are unable to resolve such Dispute within [***] of initiating such negotiations, unless otherwise agreed by the Parties, such dispute shall be finally settled under Section 11.2.

11.2 Arbitration. For any Dispute involving amounts owed under the Agreement, or whether a Party has breached its obligations under the Agreement (and/or has cured such breach), such Dispute (if not resolved by the Parties under Section 11.1) shall be resolved by final and binding arbitration in accordance with this Section 11.2, under the Commercial Arbitration Rules and Supplementary Procedures for Large Complex Disputes of the American Arbitration Association ("***AAA***") by a single arbitrator. Either Party may, following the end of the good faith negotiation period referenced in Section 11.1, refer any such Dispute to arbitration by submitting written notice to the other Party. Within [***] of delivery of such notice, the Parties shall meet and discuss in good faith and agree on (a) an arbitrator to resolve the issue, which arbitrator shall be neutral and independent of both Parties and all of their respective Affiliates, shall have significant experience and expertise in licensing and partnering agreements in the pharmaceutical industry and other relevant experience and (b) any changes in these

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arbitration provisions or the rules of arbitration which are herein adopted, in an effort to expedite the process and otherwise ensure that the process is appropriate given the nature of the dispute and the values at risk. If the Parties cannot agree on such arbitrator within [***] of request by a Party for arbitration, then such arbitrator shall be appointed by AAA, which arbitrator must meet the foregoing criteria. The arbitration shall be held in New York, New York, and the proceedings shall be conducted in the English language. The arbitrators may proceed to an award, notwithstanding the failure of either Party to participate in the proceedings. The arbitrator shall be instructed that time is of the essence in the arbitration proceeding. The arbitrator shall, within [***] after the conclusion of the arbitration hearing, issue a written award and statement of decision describing the essential findings and conclusions on which the award is based, including the calculation of any damages awarded (if applicable). The arbitrator shall be authorized to award compensatory damages, but shall not be authorized to (i) award non-economic or punitive damages to the extent expressly excluded under this Agreement, or (ii) reform, modify or materially change this Agreement or any other agreements contemplated hereunder; provided, however, that the damage limitations described in part (i) of this sentence will not apply if such damages are statutorily imposed. Judgment on the award rendered by the arbitrator may be enforced in any court having competent jurisdiction thereof, or application may be made to the court for a judicial recognition of the award or an order of enforcement as the case may be, subject only to revocation on grounds of fraud or clear bias on the part of the arbitrator. Notwithstanding anything contained in this Section 11.2 to the contrary, either Party shall have the right to seek equitable relief or interim or provisional relief from a court of competent jurisdiction, including a temporary restraining order, preliminary injunction or other interim equitable relief; concerning a dispute either prior to or during any arbitration if necessary to protect the interests of such Party or to preserve the status quo pending the arbitration proceeding. The Parties agree that the arbitration shall be kept confidential and that the existence of the proceeding and any element of its (including any pleadings, briefs or other documents submitted or exchanged, any testimony or other oral submissions and any awards) shall not be disclosed beyond the arbitrator, the Parties, their counsel and any person necessary to the conduct of the proceeding, except as may lawfully be required in judicial proceedings relating to the arbitration or otherwise.

ARTICLE 12

MISCELLANEOUS

12.1 Entire Agreement; Amendment. This Agreement, including the appendices, constitutes the entire agreement between the Parties (or their Affiliates) related to the subject matter hereof. All prior and contemporaneous negotiations, representations, warranties, agreements, statements, promises and understandings related to the subject matter hereof are superseded by and merged into and extinguished and completely expressed by this Agreement, including the exhibits. No Party shall be bound by or charged with any written or oral agreements, representations, warranties, statements, promises or understandings not specifically set forth in this Agreement. As of the Effective Date, the Confidentiality Agreement is hereby superseded by this Agreement as to Marina Bio and MirnaRx, provided that all Confidential information (as defined in the Confidentiality Agreement) disclosed thereunder shall be treated as Confidential Information disclosed under, and subject to the terms of, this Agreement. No

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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subsequent alteration, amendment, change or addition to this Agreement shall be binding upon the Parties unless reduced to writing and signed by an authorized officer of each Party.

12.2 Notices. Any notice required or permitted to be given under this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes (i) when delivered, if sent by recognized overnight courier or personally delivered, or (ii) upon confirmation of receipt, if sent by facsimile transmission (provided a duplicate hard copy is promptly delivered by one of the other foregoing means), in each case using the mailing addresses of the Parties as set forth below (or such other mailing address of which a Party is notified pursuant to this Section 11.2):

For MirnaRx:	Mirna Therapeutics, Inc. 2150 Woodward St., Suite 100 Austin, TX 78744 Attn: Chief Executive Officer Tel : (512) 901-0900 Fax : (512) 681-5201
With a copy to:	Cooley LLP Five Palo Alto Square 3000 El Camino Real Palo Alto, CA 94306-2155 Attn: Barclay James Kamb, Esq. Facsimile: (650) 849-7400
For Marina Bio:	Marina Bio Biotech, Inc. 3830 Monte Villa Parkway Bothell, Washington 98021 Attn: President & CEO Facsimile: (425) 908-3650
With a copy to:	Pryor Cashman LLP 7 Times Square New York, NY 10036 Attn: Lawrence Remmel Facsimile: (212) 798-365

12.3 Governing Law. This Agreement shall be governed and construed in accordance with the laws of the State of New York, without regard to any applicable principles of conflicts of law.

12.4 Limitation of Liability. EXCEPT FOR LIABILITY FOR BREACH OF OBLIGATIONS UNDER ARTICLE 9 OR FOR FRAUD OR COMPARABLE INTENTIONAL MISCONDUCT, NEITHER PARTY SHALL BE ENTITLED TO RECOVER FROM THE OTHER PARTY ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES IN CONNECION WITH THIS AGREEMENT OR ANY LICENSE GRANTED HEREUNDER. However, the foregoing limitations in this Section 12.4 shall not

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apply with respect to either Party's indemnification Obligations under Sections 8.1 or 8.2 for Third Party Claims.

12.5 Interpretation. Marina Bio and MirnaRx have each participated in negotiations and due diligence and consulted their respective counsel regarding this Agreement. In the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as if drafted jointly by the Parties and no presumption or burden of proof shall arise favoring or disfavoring any Party by virtue of the authorship of any provisions of this Agreement.

12.6 Assignment. This Agreement may not be assigned by either party without the express written consent of the other party, except that either Party may assign the Agreement to its Affiliate or to its successor in interest in connection with. a merger, consolidation or sale of all or substantially all of its assets.

12.7 Performance by Affiliates. Each of Marina Bio and MirnaRx acknowledge that obligations under this Agreement may be performed by Affiliates of MirnaRx.

12.8 Severability. In the event that any one or more of the provisions contained herein, or the application thereof in any circumstances, is held invalid, illegal or unenforceable in any respect for any reason, the Parties shall negotiate in good faith with a view to the substitution therefor of a suitable and equitable provision in order to carry out, so far as may be valid and enforceable, the intent and purpose of such invalid provision; provided, however, that the

validity, legality and enforceability' of any such provision in every other respect and of the remaining provisions contained herein shall not be in any way impaired thereby, it being intended that all of the rights and privileges of the Parties hereto shall be enforceable to the fullest extent permitted by law.

12.9 Headings. The heading for each article and section in this Agreement has been inserted for convenience of reference only and is not intended to limit or expand on the meaning of the language contained in the particular article or section.

12.10 Further Actions. Each Party agrees to execute, acknowledge and deliver such further instruments, and to do all such other acts, as may be necessary or appropriate in order to carry out the purposes and intent of the Agreement,

12.11 Independent Contractors. The relationship between MirnaRx and Marina Bio created by this Agreement is solely that of independent contractors. This Agreement does not create any agency, distributorship, employee-employer, partnership, joint venture or similar business relationship between the Parties. Neither Party is a legal representative of the other Party, and neither Party can assume or create any obligation, representation, warranty or guarantee, express or implied, on behalf of the other Party for any purpose whatsoever. Each Party shall use its own discretion and shall have complete and authoritative control over its employees and the details of performing its obligations under this Agreement.

12.12 No Waiver. A Party's consent to or waiver, express or implied, of the other Party's breach of its obligations hereunder shall not be deemed to be or construed as a consent to or waiver of any other breach of the same or any other obligations of the other Party. A Party's failure to complain of any act, or failure to act, by the other Party, to declare the other Party in

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default, to insist upon the strict performance of any Obligation or condition of this Agreement or to exercise any right or .remedy consequent upon a breach thereof, no matter how long such failure continues, shall not constitute a waiver by such Party of its rights hereunder, of any such breach, or of any other obligation or condition. A Party's consent in any one instance shall not limit or waive the necessity to obtain such Party's consent in any future instance and in any event no consent or waiver shall be effective for any purpose .hereunder unless such consent or waiver is in writing and signed by the Party granting such consent or waiver.

12.13 Fees and Expenses. Regardless of whether or not the transactions contemplated by this Agreement are consummated, each Party shall bear its own fees and expenses incurred in connection with the negotiation and execution of this Agreement.

12.14 No Other Rights. The Parties acknowledge and agree that, except as expressly set forth in this Agreement, neither Party grants any fights or licenses to the other Party under this Agreement nor shall either Party have any rights or obligations under this Agreement.

12.15 Parties in Interest. This Agreement shall be binding upon and inure solely to the benefit of each Party hereto and its respective successors and permitted assigns, and nothing in this Agreement, express or implied, is intended to or shall confer upon any other person any right, benefit or remedy of any nature whatsoever under or by reason of this Agreement (with the exception of MirnaRx Indemnitees and Marina Bio Indemnitees under Sections 8.1 and 8.2, respectively).

12.16 Rules of Construction. The use in this Agreement of the term "***including***" (or any cognates thereof, such as "***include***" or "***includes***") means "***including*** (or the applicable cognate thereof), without limitation." The words "***herein***," "***hereof***," "***hereunder***," and other words of similar import refer to this Agreement as a whole, including the exhibits, and not to any particular section, subsection, paragraph, subparagraph or clause contained in this Agreement. All references to sections and exhibits mean those sections of this Agreement and the Appendixes attached to this Agreement, except where otherwise-stated.

12.17 Counterparts. This Agreement may be executed in two (2) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

[Signature page follows]

IN WITNESS WHEREOF, the Parties have executed this Agreement by their duly authorized representatives as of the Effective Date.

MARINA BIOTECH, INC.	**MIRNA THERAPEUTICS, INC.**
By: /s/ J. Michael French	By: /s/ Paul Lammers
Print Name: J. Michael French	Print Name: Dr. Paul Lammers
Title: President and CEO	Title: President and CEO

APPENDIX A

LIST OF CERTAIN LICENSED PATENTS

Case No.	Title	Jurisdiction	Application Number	Filing Date	Patent Number	Date Issued	Estimated Expiration Date	Status
[***]	[***]	[***]	[***]	[***]	[***]	[***]	[***]	[***]

[***] 8 pages in this document have been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

APPENDIX B

EXAMPLE OF CALCULATION OF CUMULATIVE SUBLICENSE FEES

The following is an example of the calculation of payment of Sublicense Fees under Section 5.6, under a hypothetical sublicense agreement under this Agreement:

Hypothetical: Assume that MirnaRx grants a sublicense to a Sublicensee to develop and commercialize its Licensed Product "[***]" when such product has [***] but before [***]. Assume further that under such sublicense agreement, the Sublicensee pays MirnaRx an upfront sublicense fee of $[***], pays no milestone payment on [***], and pays MirnaRx the following milestone payments with respect to such sublicense grant on achieving the listed milestone events: (a) $[***] on [***], $[***] on [***], and $[***] on [***].

Based on the foregoing assumptions (and understanding that this is just a hypothetical example and provides no precedence or assumption of the terms of an actual sublicense deal), MirnaRx would pay to Marina Bio Sublicense Fees in the following amounts and times under such hypothetical:

- Sublicense Fee of $[***], by the date [***] after the upfront sublicense fee is paid ([***]% of the upfront)
- Sublicense Fee of $[***], by the date [***] after the [***] milestone for [***] is achieved by Sublicensee (the "True-Up Payment" of $[***] equal to the difference between the "[***]" milestone payment amount under Section 5.3(a)(i)(2) and the "Cumulative Sublicense Fees" paid to Marina Bio up to that point for such product)
- Sublicense Fee of $[***], by the date [***] after [***] (equal to [***]% of the milestone payment made by the Sublicensee, plus a "True-up Payment" of $[***], such that the Cumulative Sublicensee Fees as of such date (such cumulative amount equal to $[***] after such True-Up Payment) equals the Milestone Payment Sum as of such date (which is $[***], including the milestone payment amount under Section 5.3(a)(i)(3) for achieving a [***] milestone)
- Sublicense Fee of $[***] by the date [***] after [***] ([***]% of the milestone payment paid by Sublicensee to MirnaRx for [***])
- Sublicense Fee of $[***], by the date [***] after [***] (equal to [***]% of the milestone payment by the Sublicensee, plus a "True-up Payment" of $[***], such that the Cumulative Sublicensee Fees as of such date (such cumulative amount equal to $[***] after such True-Up Payment) equals the Milestone Payment Sum as of such date (which is $[***], including the milestone payment amount under Section 5:3(a)(i)(4) for [***])

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

APPENDIX C

JOINT PRESS RELEASE

Marina Biotech and Mirna Therapeutics Announce License Agreement for the Development of microRNA-based Therapeutics

- Mirna Therapeutics will develop oncology-focused compounds utilizing their proprietary microRNAs combined with Marina Biotech's novel SMARTICLES® liposomal delivery technology -

Bothell, WA and Austin, TX December 23, 2011 — Marina Biotech, Inc. (Nasdaq: MRNA), a leading oligonucleotide-based drug discovery and development company, and Mirna Therapeutics, Inc. (Mirna), a privately-held biotechnology company pioneering microRNA (miRNA) replacement therapy for cancer, announced today that they have entered into a license agreement regarding the development and commercialization of microRNA-based therapeutics utilizing Mirna's proprietary microRNAs and Marina Biotech's novel SMARTICLES liposomal delivery technology. Mirna will have full responsibility for the development and commercialization of any products arising under the Agreement and Marina Biotech will support pre-clinical and process development efforts. Under terms of the Agreement, Marina Biotech could receive up to $63 million in total upfront, clinical and commercialization milestone payments, as well as royalties on sales, based on the successful outcome of the collaboration. Further terms of the Agreement were not disclosed.

"Given the challenge of effectively delivering oligonucleotides to target tissues, we devoted considerable effort to identifying an optimal delivery technology that would allow for systemic administration of our potent miRNA tumor suppressors and which is already in clinical testing," said Paul Lammers, M.D., M.Sc., President and CEO of Mirna Therapeutics. "With the dramatic in vivo results achieved with our miRNA. mimics, we believe the SMARTICLES technology solves the delivery challenge for us, and we are now looking forward to bringing our miRNA mimics into the clinic in the next 18 months as promising targeted cancer therapeutics.

"We are extremely pleased to have entered into this relationship with a company as well respected in the area of microRNA-based therapeutics as Mirna Therapeutics," stated J. Michael French, President and CEO of Marina Biotech. "We are excited to see the continued advancement of oligonucleotide-based therapeutics and to be able to provide a technology capable of effectively delivering, in this case, systemically administered miRNA mimetics. We look forward to the rapid advancement. of Mirna. Therapeutics' clinical pipeline and the opportunity to bring novel therapeutics to patients in need."

In a recent poster entitled "The Development of a miRNA-based Therapeutic Candidate for Hepatocellular Carcinoma," presented at the November, 2011 AACR-.NCI-EORTC International Conference on Molecular Targets and Cancer Therapeutics in San Francisco, CA, Mirna scientists showed that mimics of five tumor suppressor miRNAs, including miR-34 and let-7, all significantly inhibited the growth of liver tumors compared to animals treated with formulated negative control miRNAs. The five miRNA mimics were complexed. with Marina

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Biotech's SMARTICLES delivery formulation and injected into NOD/SCID mice with orthotopically grown Hep3B human liver cancer xenografts.

The companies will present their respective science and technologies at the upcoming Biotech Showcase™ 2012, January 9-11, 2012 at the Parc 55 Wyndham San Francisco - Union Square at 55 Cyril Magnin Street, San Francisco, CA. Mirna Therapeutics will present on Monday, 9 January at 3:00 pm and Marina Biotech will present on Tuesday, 10 January at 2:30 pm.

About Marina Biotech, Inc.

Marina Biotech is a biotechnology company focused on the development and commercialization. of oligonucleotide-based therapeutics utilizing multiple mechanisms of action including RNA interference (RNAi) and messenger RNA translational blocking. The Marina Biotech pipeline currently includes a clinical program in Familial Adenomatous Polyposis (a precancerous syndrome) and two preclinical programs — in bladder cancer and malignant ascites. Marina Biotech entered into an exclusive agreement with The Debiopharm Group for the development and commercialization of the bladder cancer program. Marina Biotech's goal is to improve human health through the development of RNAi- and oligonucleotide-based compounds and drug delivery technologies that together provide superior therapeutic options for patients. Additional information about Marina Biotech is available at http://www.marinabio.com.

About Mirna Therapeutics, Inc.

Mirna Therapeutics is a biotechnology company focused on the development and commercialization of microRNA (miRNA) therapeutics. The Company has a substantial intellectual property portfolio on the therapeutic use of miRNAs developed by its own scientists as well as in-licensed from other institutions. Mirna's IP portfolio contains >300 miRNAs with applications in oncology and other diseases. Oncology-directed miRNAs include those that are key tumor suppressors in cancer, such as miR-34 and let-7 that have proven to block tumor growth in. a number of different pre-clinical animal studies. The Company, founded in 2007, is located in Austin, Texas, and has received significant funding from the State of Texas, both through the State's Emerging Technology Fund and from the Cancer Prevention and Research Institute of Texas (CPRIT). Mirna Therapeutics is the recipient of a $10.3 million commercialization award from CPRIT. For more information, visit www.MirnaRx.com

Forward-Looking Statements

Statements made in this news release may be forward-looking statements within the meaning of Federal Securities laws that are subject to certain risks and uncertainties and involve factors that may cause actual results to differ materially from those projected or suggested. Factors that could cause actual results to differ materially from those in forward-looking statements include, but are not limited to: (i) the ability of Marina Biotech to obtain additional funding; (ii) the ability of Marina Biotech to attract and/or maintain manufacturing, research, development and commercialization partners; (iii) the ability of Marina Biotech and/or a partner to successfully complete product research and development, including preclinical and clinical studies and commercialization; (iv) the ability of Marina Biotech and/or a partner to obtain required governmental approvals; and (v) the ability of Marina Biotech and/or a partner to develop and

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commercialize products prior to, and that can compete favorably with those of, competitors. Additional factors that could cause actual results to differ materially from those projected or suggested in any forward-looking statements are contained in Marina Biotech's most recent periodic reports on Form 10-K and Form 10-Q that are filed with the Securities and Exchange Commission. Marina Biotech assumes no obligation to update and supplement forward-looking statements because of subsequent events.

Marina Biotech, Inc.
Philip Ranker
Interim Chief 'Financial Officer
(425) 908-3615
pranker@marinabio.com

Mirna Therapeutics, Inc.
Paul Lammers, M.D., M.Sc.
President and Chief Executive Officer
(512) 901-0900
plammers@mirnarx.com

Exhibit 10.3(B)

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

CONFIDENTIAL

December 22, 2011

Marina Biotech, Inc.
3830 Monte Villa Parkway
Bothell, Washington 98021
Attn: Michael French, Chief executive Officer

Re: Agreement re Option Compound and miR-34 Sequences

Dear Michael:

As you know, Mirna Therapeutics, Inc. ("MirnaRx") and Marina Biotech, Inc. ("Marina Bio") are entering into that certain License Agreement effective as of the date set forth above (the "License Agreement"). This letter agreement is that certain Side Agreement referred to in the License Agreement, and it sets forth the RNA oligonucleotide sequences of certain MirnaRx Compounds which are covered by rights under the Licensed Agreement.

The Parties hereby agree that the list of RNA oligonucleotide sequences attached as the Appendix of this letter agreement comprises sequences of the Option Compounds and miR-34, as such terms are used in the Licensed Agreement, and that such list may be amended by MirnaRx as provided in Section 2.6 of the Licensed Agreement, to [***]. The Parties further agree that such sequences are the highly confidential information of MirnaRx, and Marina Bio shall not disclose such sequences to any third party or use them for any purpose outside of the License Agreement.

AGREED TO BY

Mirna Therapeutics, Inc.

Signature: /s/ Paul Lammers
Paul Lammers, M.D., M.Sc.
Chief Executive Officer

Marina Biotech, Inc.

Signature: /s/ Michael French
Michael French
Chief Executive Officer

APPENDIX

Option Compound Sequences:

[***]

miR-34 Sequence:

[***]

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Exhibit 10.3(C)

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

November 16, 2012 M0389

Marina Biotech, Inc.
3830 Monte Villa Parkway
Bothell, Washington 98201

Re: Amendment Regarding Payment of Certain Milestone Payments (the "Amendment")

Gentlemen:

Reference is made to that certain License Agreement (the "*Agreement*") effective December 22, 2011 by and between Mirna Therapeutics, Inc., a Delaware corporation ("*MirnaRx*"), and Marina Biotech, Inc., a Delaware corporation ("*Marina Bio*"). Each of MirnaRx and Marina Bio may be referred to herein as a "*Party*" or together as the "*Parties*." Capitalized words used but not defined herein shall have the meaning ascribed to such terms in the Agreement. MirnaRx and Marina Bio agree as follows:

1. With respect to the first Licensed Product, the Milestone Payment of [***] set forth in Section 5.3(a)(i)(1) of the Agreement related to [***] shall be reduced to [***] provided that such Milestone Payment is paid in full by MirnaRx to Marina Bio on or before [***].

2. In order to induce MirnaRx to enter into this Amendment, Marina Bio hereby affirms and restates as of the date hereof each of its representations and warranties contained in Section 7.1 of the Agreement. Without limiting the foregoing, Marina Bio affirms that it owns all the Licensed Technology, has full legal rights and authority to grant the licenses and rights under the Licensed Technology granted under the Agreement, and has not assigned, transferred, conveyed or licensed its right, title and interest in the Licensed Technology in any manner inconsistent with such license grant or the other terms of the Agreement. Marina Bio further agrees that in the event that Marina Bio sells, assigns, conveys or otherwise transfers any of its right, title and interest in the Licensed Technology, it shall require, as a condition of any such sale, assignment, conveyance or transfer, that the purchaser or assignee, as the case may be, of such Licensed Technology expressly assume Marina Bio's obligations under the Agreement with respect to such Licensed Technology. Nothing contained in the foregoing sentence shall amend the restrictions on assignment of the Agreement set forth in Section 12.6 of the Agreement.

3. Marina Bio hereby further represents and warrants to MirnaRx as follows:

(a) As of the date hereof Marina Bio has the corporate power and authority and legal right to enter into this Amendment and perform its obligations hereunder. Marina Bio has taken all necessary corporate action on its part required to authorize the execution and delivery of this Amendment and the performance of its obligations hereunder. This Amendment constitutes the legal, valid and binding obligation of Marina Bio that is enforceable against it in accordance with its terms.

(b) The execution, delivery and performance of this Amendment by Marina Bio does not conflict with, and will not result in a breach of, any material agreement, instrument or understanding, oral or written to which it is a party or by which it may be bound, nor violate any material law or regulation of any court, governmental body or administrative or other agency having jurisdiction over it.

4. Except as expressly amended by this Amendment, all terms and conditions of the Agreement are and shall remain in full force and effect.

5. This Amendment shall be governed by the laws of the State of New York, without regard to any applicable principles of conflicts of laws.

6. This Amendment may be executed in two (2) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

7. This Amendment shall be treated as Confidential Information by the Parties hereto and neither Party shall disclose this Amendment, or any of the terms included herein, to Third Parties without the prior written consent of the other Party or except as provided in Section 9.2 or 9.3 of the Agreement (treating such information as Confidential Information for purposes of Sections 9.2 and 9.3 of the Agreement).

8. To the extent that the terms set forth in this Amendment conflict with the terms of the Agreement, the terms of this Amendment shall govern and control.

If the foregoing accurately reflects our agreement with respect to the subject matter set forth herein, please indicate your acceptance by countersigning below and returning to us a copy of this letter, which shall thereupon constitute a binding agreement between MirnaRx and Marina Bio effective as of the date set forth above.

Best regards.

Mirna Therapeutics, Inc.

By: /s/ Paul Lammers

Paul Lammers
Chief Executive Officer

Acknowledged and Agreed on Behalf of Marina Biotech, Inc. by its duly authorized representative:

By: /s/ J. Michael French
Name: J. Michael French

Title: President and CEO

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

AMENDMENT No. 1 to LICENSE AGREEMENT

This AMENDMENT NO. 1 to LICENSE AGREEMENT (this "**Amendment**") is made and entered into effective as of December 27, 2013 (the "**Amendment Effective Date**"), by and between Mirna Therapeutics, Inc., a Delaware corporation with offices at 2150 Woodward Street, Suite 100, Austin, Texas 78744 ("**MirnaRx**"), and Marina Biotech, Inc., a Delaware corporation with offices at 3830 Monte Villa Parkway, Bothell, Washington 98021 ("**Marina Bio**").

WHEREAS, MirnaRx and Marina Bio are parties to a License Agreement dated December 22, 2011 (the "**License Agreement**"), pursuant to which Marina Bio granted to MirnaRx a license under Marina Bio's technology and intellectual property rights relating to Marina Bio's liposomal delivery technology known as NOV340 (the "**Marina Technology**"), to develop and commercialize drug products incorporating such Marina Technology in combination with MirnaRx's proprietary compound miR-34, and other specified compounds selected by MirnaRX pursuant to the terms of the License Agreement; and

WHEREAS, MirnaRx and Marina Bio desire to amend the License Agreement to modify the consideration payable by MirnaRX to Marina Bio upon selection by MirnaRx of certain additional compounds for further development and commercialization using the Marina Technology, the timing of the payment of such consideration, and to modify certain milestone and royalty payment obligations relating to the development and commercialization of products containing miR-34 using the Marina Technology.

NOW THEREFORE, in consideration of the foregoing premises, the mutual promises and covenants of the Parties hereinafter set forth, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties, intending to be legally bound, do hereby agree as follows.

1.1. Amendment of License Agreement. In accordance with Section 12.1 of the License Agreement, the Parties hereby agree to amend the License Agreement, effective as of the Amendment Effective Date, in accordance with the remainder of this Section 1. Capitalized terms not defined in this Amendment shall have the meaning given to those terms in the License Agreement. With the exception of those sections of the License Agreement that are expressly amended by this Amendment, the remainder of the Master Agreement shall remain in full force and effect as provided therein.

1.2. Section 1.48 of the License Agreement shall be amended and restated in its entirety with the following:

1.48 "**Selected MirnaRx Compound**" means: (a) the MirnaRx Compound known as miR-34 (the sequence of which is set forth in the Side Letter); or (b) any other MirnaRx Compound that MirnaRx selects, as provided in Section 2.6, to combine with the Marina Bio Technology and to develop (or have developed) as a Licensed Product, and including, for any such Selected MirnaRx Compound, any other MirnaRx Compound that

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has at least [***] sequence homology with such Selected MirnaRx Compound, and for each of (a) and (b) including without limitation the compounds listed on Appendix D.

1.3. Section 5.2 of the License Agreement shall be amended and restated in its entirety with the following:

5.2 **Selection Fee Payments:**

(a) As permitted by Section 2.6, in addition to miR-34, MirnaRx has selected three (3) Option Compounds that are listed on Appendix D to be Selected MirnaRx Compounds. In partial consideration of the license rights granted by Marina Bio under this Agreement, and for the right to develop and commercialize such additional Selected MirnaRx Compounds, MirnaRx shall pay Marina Bio [***] for the designation of such [***] as Selected MirnaRx Compounds equal to [***], which amount shall be paid in full on or before December 27, 2013

(b) With respect to any new MirnaRx Compound that is selected by MirnaRx as a Selected MirnaRx Compound in accordance with Section 2.6 (including without limitation any Option Compound not listed on Appendix D), then MirnaRx shall pay Marina Bio an additional compound selection fee of [***], such amount to be paid as follows: (i) with respect to any Option Compound (other than those listed on Appendix D) that is selected by MirnaRx as a Selected MirnaRx Compound in accordance with Section 2.6, (i) [***] of such amount shall be paid within [***] of the date that MirnaRx selects the Selected MirnaRx Compound under Section 2.6, and (ii) the balance [***] will be paid [***], and (b) with respect to any Selected MirnaRx Compounds that are not Option Compounds when selected by MirnaRx under Section 2.6, the total amount of [***] for such Selected MirnaRx Compound shall be paid within [***] of the date that MirnaRx selects the Selected MirnaRx Compound under Section 2.6. All such selection fees shall be in addition to any amounts due based on sublicensing Revenue received by MirnaRx (if any) for sublicensing a Licensed Product containing the applicable Selected MirnaRx Compound, as set forth in Section 5.6 below.

1.4. A new Appendix D shall be added to the License Agreement entitled "Selected MirnaRx Compounds", which shall read in its entirety as follows:

Appendix D

miR-34
[***]

1.5. Simultaneous with the execution of this Amendment, MirnaRx shall provide to Marina Bio the sequences of each of the Selected MirnaRx Compounds listed an Appendix D in a separate side letter (the "**Amendment Side Letter**"). The Amendment Side Letter shall also set forth the sequences of the remaining Option Compounds that have not been designated by MirnaRx as Selected MirnaRx Compounds as of the Amendment Effective Date.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

1.6. Section 5.3 shall be amended and restated in its entirety with the following:

5.3 **Milestone Payments**.

(a) In partial consideration of the license rights granted by Marina Bio under this Agreement, MirnaRx shall pay to Marina Bio a milestone payment upon the first achievement by MirnaRx (independently of work done by or in collaboration with a Sublicensee) of the applicable milestone event set forth in the table below, such payments to be in the listed amounts for the applicable Milestone Event:

Milestone Event	Milestone Payment
(i) For each Licensed Product:	
[***]	[***]
(ii) For each Additional Indication for the Licensed Product, up to total of [***] Additional Indications:	
(1) [***]	[***]

(b) For clarity, each of the above milestone payments shall be paid only once for a particular Licensed Product, regardless if any such Milestone Event is achieved more than once, except that [***]. Further, if a particular Licensed Product achieves a particular Milestone Event under subclause (i) of the above table without having achieved a previous Milestone Event in such subclause (i), then such previous Milestone Event shall be deemed also achieved, and the Milestone Payment associated with such Milestone Event shall then be paid with the achievement of the subsequent Milestone Event. For illustrative purposes only, if the [***] Milestone Event as set forth in (i)(3) in the table above is not achieved for a Licensed Product but the [***] Milestone Event as set forth in (i)(4) above is achieved for such Licensed Product, then the Milestone Payment for achievement of the Milestone Event in clause (i)(3) [***] will be paid when the Milestone Payment for (i)(4) is paid. The total amount of milestone payments payable for a particular Licensed Product under the above shall not, in any event, exceed $6,000,000 under subclause (i) of the above table and $10,000,000 in total. For additional clarity, if MirnaRx (or its Affiliate) enters into a sublicense Agreement under which the applicable Sublicensee is granted sublicense rights to Commercialize a Licensed Product, then achievement of any of the above Milestone Events by such Sublicensee, or by MirnaRx or its Affiliate working in collaboration with such Sublicensee under the sublicense agreement, shall not create a Milestone Payment obligation, but instead MirnaRx shall have the obligation to share Sublicense Revenues received under such sublicense agreement as provided in Section 5.6 below.

(c) Notwithstanding Sections 5.3(a) and 5.3(b) and the milestone table above, (i) no Milestone Payment for achievement of [***] of the milestone table above, and (ii) no

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Milestone Payments for [***] of the milestone table above, shall be payable with respect to any Licensed Product containing or incorporating miR-34. For clarity, Sections 5.3(a) and 5.3(b) and the milestone table above shall apply in full to all Licensed Products other than any Licensed Product containing or incorporating miR-34, unless the Parties mutually agree otherwise in writing.

1.7. The Parties acknowledge and agree that as of the Amendment Effective Date, the Milestone Payment for the achievement of the Milestone Event [***] of the milestone table above has been paid in full by MirnaRx [***].

1.8. Section 5.4 shall be amended and restated in its entirety with the following:

5.4 **Royalties.** In part consideration of the license rights granted by Marina Bio under this Agreement, and subject to the provisions of Sections 5.5, MirnaRx shall pay royalties to Marina Bio on sales by MirnaRx or any of its Affiliates of Licensed Products during the Royalty Term, as follows:

(a) For sales of Licensed Product in country(ies) where such sale would infringe, absent the license granted in Section 2.1, a Valid Claim of an issued Licensed Patent, MirnaRx shall pay to Marina Bio royalties equal to [***] of the Net Sales revenue recognized by MirnaRx or any of its Affiliates from such sales, provided that solely with respect to any Licensed Product containing or incorporating miR-34, no royalty shall be payable by MirnaRx with respect to sales in any country.

(b) For sales of Licensed Product in country(ies) where either (i) there is no Valid Claim in an issued Licensed Patent that would be infringed, absent the license granted in Section 2.1, by such sale of the Licensed Product, or (b) there are sales of Generic Products during the same royalty period as such sales of Licensed Product, then MirnaRx shall pay to Marina Bio royalties equal to [***] of the Net Sales revenue recognized by MirnaRx or any of its Affiliates from such Licensed Product sales, provided that solely with respect to any Licensed Product containing or incorporating miR-34, no royalty shall be payable by MirnaRx with respect to sales in any country.

1.9. Section 12.1 shall be amended and restated in its entirety with the following:

12.1 **Entire Agreement; Amendment**. This Agreement, including the appendices, and the Side Letter, constitutes the entire agreement between the Parties (or their Affiliates) related to the subject matter hereof. All prior and contemporaneous negotiations, representations, warranties, agreements, statements, promises and understandings related to the subject matter hereof are superseded by and merged into and extinguished and completely expressed by this Agreement, including the exhibits and the Side Letter. No Party shall be bound by or charged with any written or oral agreements, representations, warranties, statements, promises or understandings not specifically set forth in this Agreement and the Side Letter. As of the Effective Date, the Confidentiality Agreement is hereby superseded by this Agreement as to Marina Bio and MirnaRx, provided that all Confidential Information (as defined in the Confidentiality Agreement) disclosed thereunder shall be treated as Confidential Information disclosed

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under, and subject to the terms of, this Agreement. No subsequent alteration, amendment, change or addition to this Agreement or the Side Letter shall be binding upon the Parties unless reduced to writing and signed by an authorized officer of each Party.

1.10. Counterparts; Facsimile Execution. This Amendment may be executed in two (2) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. This Amendment may be executed by facsimile signatures and such signatures shall be deemed to bind each Party as if they were original signatures.

[*Signature Page Follows*]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective officers thereunto duly authorized as of the Amendment Effective Date.

MIRNA THERAPEUTICS, INC.		**MARINA BIOTECH, INC.**	
Signature:	/s/ Paul Lammers	Signature:	/s/ J. Michael French
Name:	Dr. Paul Lammers	Name:	J. Michael French
Title:	President and CEO	Title:	President and CEO

Exhibit 10.3(E)

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

CONFIDENTIAL

January 9, 2014

Marina Biotech, Inc.
3830 Monte Villa Parkway
Bothell, Washington, 98021
Attn: Michael French, Chief executive Officer

Re: **Agreement re Option Compound and miR-34 Sequences**

Dear Michael:

As you know, Mirna Therapeutics, Inc. ("**MirnaRx**") and Marina Biotech, Inc. ("**Marina Bio**") have entered into an amendment, effective as December 27, 2013, to that certain license agreement dated December 22, 2011 (the "**License Agreement**", and such amendment the "**Amendment**"). This letter agreement is that certain Amendment Side Letter referred to in the Amendment, and it sets forth the RNA oligonucleotide sequences of the Option Compounds that the Parties are agreeing to designate as Selected MirnaRx Compounds pursuant to the terms of the License Agreement. Capitalized terms not defined in this Amendment Side Letter shall have the meaning given to those terms in the License Agreement.

The Parties hereby agree that the list of RNA oligonucleotide sequences attached as the Appendix of this Amendment Side Letter comprises sequences of miR-34, [***] as well as the sequences of two Option Compounds [***] under the terms of the License Agreement. The Parties further agree that such sequences are the highly confidential information of MirnaRx, and Marina Bio shall comply with the confidentiality obligations set forth in the License Agreement with respect thereto, and shall not disclose such sequences to any third party or use them for any purpose outside of the License Agreement.

AGREED TO BY:

Mirna Therapeutics, Inc.

Signature: /s/ Paul Lammers
Paul Lammers, M,D., M.Sc.
Chief Executive Officer

Marina Biotech, Inc.

Signature: /s/ Michael French
Michael French
Chief Executive Officer

CONFIDENTIAL

APPENDIX

miR-34 Sequence:
[***]

[***]

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

AMENDED AND RESTATED AGREEMENT

THIS AMENDED AND RESTATED AGREEMENT (the "Agreement") by and between YALE UNIVERSITY, a corporation organized and existing under and by virtue of a charter granted by the general assembly of the Colony and State of Connecticut and located in New Haven, Connecticut ("YALE"), and Mirna Therapeutics, Inc., a corporation organized and existing under the laws of the State of Delaware and with principal offices located in Austin, Texas ("LICENSEE") is effective as of the date of final signature below ("EFFECTIVE DATE").

Article 1. BACKGROUND

1.1 As of August 28, 2006 YALE and Asuragen, Inc., a corporation organized and existing under the law of the State of Delaware with principal offices located in Austin, Texas ("ASURAGEN") entered into an exclusive license agreement ("ORIGINAL AGREEMENT") related to certain patents which arose in the course of research conducted under YALE auspices by [***] in the Department of Molecular, Cellular and Developmental Biology at YALE (the "INVENTOR"), including an invention entitled [***] (the "INVENTION").

1.2 On November 9, 2009, ASURAGEN transferred all of its assets related to research and development of microRNA therapeutics to LICENSEE, including the ORIGINAL AGREEMENT (with notice of such transfer having been sent to YALE on December 19, 2009).

1.3 YALE and LICENSEE have decided to expand the scope of the ORIGINAL AGREEMENT to include (a) certain additional intellectual property which [***] (the "INVENTORS") related to [***] including, without limitation, the INVENTION (the " INVENTIONS") and (b) certain intellectual property [***] (collectively, the "POOLED PATENTS" as defined below).

1.4 To the extent that the INVENTORS of any claims of the INVENTIONS were employees or agents of YALE at the time any of the INVENTIONS were invented (including, without limitation, the INVENTION), such INVENTORS have assigned to YALE all of their right, title and interest in and to the INVENTIONS and any resulting patents.

1.5 YALE wishes to have the INVENTIONS and any resulting patents commercialized to benefit the public good.

1.6 LICENSEE has represented to YALE to induce YALE to enter into this Agreement that it shall act diligently to develop and commercialize the PRODUCTS for public use throughout the LICENSED TERRITORY (as defined below).

1.7 YALE is willing to grant a license to LICENSEE, subject to the terms and conditions of this Agreement.

1.8 In consideration of these statements and mutual promises, YALE and LICENSEE agree to the terms of this Agreement and amend and restate, in their entirety, the terms of the ORIGINAL AGREEMENT as of the EFFECTIVE DATE.

Article 2. DEFINITIONS

The following terms used in this Agreement shall be defined as set forth below:

2.1 "AFFILIATE" shall mean any entity or person that directly or indirectly controls, is controlled by or is under common control with LICENSEE. For purposes of this definition, "control" means possession of the power to direct the management of such entity or person, whether through ownership of more than fifty percent (50%) of voting securities, by contract or otherwise.

2.2 "CONFIDENTIAL INFORMATION" shall mean all information disclosed by one party to the other during the negotiation of or under this Agreement in any manner, whether orally, visually or in tangible form, that relates to ALL PATENTS or the Agreement itself, unless such information is subject to an exception described in Article 8.2; provided, however, that CONFIDENTIAL INFORMATION that is disclosed in tangible form shall be marked "Confidential" at the time of disclosure and CONFIDENTIAL INFORMATION that is disclosed orally or visually shall be identified as confidential at the time of disclosure and subsequently reduced to writing, marked confidential and delivered to the other party within thirty (30) days of such disclosure. CONFIDENTIAL INFORMATION shall include, without limitation, materials, know-how and data, technical or non-technical, trade secrets, inventions, methods and processes, whether or not patentable. Notwithstanding any other provisions of this Article 2.2, CONFIDENTIAL INFORMATION of LICENSEE that is subject to Article 8 of this Agreement is limited to information that LICENSEE supplies pursuant to LICENSEE's obligations under Articles 7 and 9 of this Agreement, unless otherwise mutually agreed to in writing by the parties.

2.3 "EARNED ROYALTY" is defined in Article 6.1.

2.4 "EFFECTIVE DATE" is defined in the introductory paragraph of this Agreement.

2.5 "FDA" shall mean the United States Food and Drug Administration or any comparable regulatory authority in a country or group of countries other than the United States.

2.6 "FIELD" shall mean all human therapeutic uses.

2.7 "FIRST SALE" shall mean the first sale to a THIRD PARTY of any PRODUCT in any country.

2.8 "ND" shall mean an investigational new drug application filed with the United States Food and Drug Administration prior to beginning clinical trials in humans in the United States or any comparable application filed with regulatory authorities in or for a country or group of countries other than the United States.

2.9 “INVENTION”, “INVENTIONS”, “INVENTORS” and “INVENTOR” are defined in Article 1.1.

2.10 “INSOLVENT” shall mean that LICENSEE (i) has ceased to pay its debts in the ordinary course of business, (ii) has current assets that are insufficient to pay its current obligations and has been in this situation for at least 12 months, (iii) is insolvent as defined by the United States Federal Bankruptcy Law, as amended from time to time, or (iv) has commenced bankruptcy, reorganization, receivership or insolvency proceedings, or any other proceeding under any Federal, state or other law for the relief of debtors.

2.11 “LICENSE” refers to the licenses granted under Article 3.1.

2.12 “LICENSED TERRITORY” shall mean The United States of America, including its territories and possessions, and any foreign countries where either party may have filed or obtained corresponding foreign patents or applications for one or more POOLED PATENTS.

2.13 “NDA” shall mean a new drug application filed with the United States Food and Drug Administration to obtain marketing approval for a PRODUCT in the United States or any comparable application filed with a regulatory authority in or for a country or group of countries other than the United States.

2.14 “NET SALES” shall mean:

(a) gross revenues actually received from the sale, lease or other transfer or disposition of ROYALTY PRODUCTS, or from services performed using ROYALTY PRODUCTS, by LICENSEE, SUBLICENSEES or AFFILIATES to THIRD PARTIES, except as set forth in Article 2.16(b), less the following deductions, provided they actually pertain to the disposition of the ROYALTY PRODUCTS [***]:

(i) all discounts, credits and allowances on account of returns;

(ii) transportation and insurance; and

(iii) duties, taxes and other governmental charges levied on the import, export, sale, transportation or delivery of ROYALTY PRODUCTS, but not including revenue taxes.

(b) No deductions shall be made for any other costs or expenses, including but not limited to [***].

(c) “NET SALES” shall not include the gross revenues for ROYALTY PRODUCTS sold to, or services performed using ROYALTY PRODUCTS for, any AFFILIATE unless such AFFILIATE is an end-user of any ROYALTY PRODUCT, in which case such consideration shall be included in NET SALES at the [***] during the same quarter.

2.15 “POOLED PATENTS” shall mean all United States and foreign patent application(s) and patents(s) listed in Exhibit A and owned or controlled in whole or in part by YALE and/or LICENSEE during the TERM of this Agreement, together with any continuations, divisionals, and continuations-in-part, to the extent the claims of any such patent or patent application are directed to subject matter specifically described in the patent applications listed on Exhibit A; any reissues, re-examinations, or extensions thereof, or substitutes therefor; and

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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the relevant international equivalents of any of the foregoing. Exhibit A shall be updated by the parties as necessary but at least on an annual basis.

(1) It is understood that the parties will co-operate as promptly as possible after the EFFECTIVE DATE and on an on-going basis during the TERM of the Agreement, in good faith, to expeditiously determine and update as necessary, legally proper inventorship for the POOLED PATENTS. Such determination shall involve the selection and engagement of an independent intellectual property attorney with no prior relationship to either party within [***] days following the EFFECTIVE DATE by mutual written agreement of the parties. Such attorney shall provide to both parties a full written disclosure of any prior relationship or potential conflict with either party. The parties shall endeavor to have the determination completed for all inventorship determinations [***] as soon as possible following the selection of the intellectual property attorney in accordance with the process set out in 2.12(2).

(2) The attorney selected and engaged pursuant to the above this Paragraph shall be required to conduct [***] of the POOLED PATENTS to [***]. As part of his/her engagement, such attorney shall [***] upon completion of his/her analysis [***], and the parties shall request that such analysis to be completed within [***] days of the attorney’s engagement to the extent that such is practicable. The parties agree that the determination by such attorney [***] and is [***].

(3) The parties agree to [***] associated with the review by such attorney.

(4) If, as a result of the procedure outlined in Article 2.12(1), it is determined that, with respect to either party to this Agreement, there is no employee or agent of that party that is a joint or sole inventor of [***] POOLED PATENT, then: (i) that party acknowledges and agrees that it shall [***]. In such event, the [***], and (ii) in such event, LICENSEE acknowledges that, notwithstanding the result of the procedure referenced in Article 2.12(1), the results of such determination [***] in Articles 4.3, 5.1, 5.2, 6.1, 6.3, 7.3 and 11.2(a).

YALE and LICENSEE agree and understand that [***] as a result of the procedure referenced in Article 2.12(1) and 2.12(2) above or [***]. The parties agree that the rights licensed by YALE herein shall include whatever rights YALE has or will have to any patents or patents applications that [***] the POOLED PATENTS.

2.16 “PRODUCT” shall mean any product (including any apparatus or kit) or component part thereof, the manufacture, use or sale of which would infringe a VALID CLAIM of a POOLED PATENT in a country in the LICENSED TERRITORY.

2.17 "REASONABLE COMMERCIAL EFFORTS" shall mean documented efforts that are [consistent with those utilized by companies of similar size and type, in similar commercial circumstances, that are developing, or have successfully developed, products and/or services similar to PRODUCTS. In determining REASONABLE COMMERCIAL EFFORTS with respect to a particular PRODUCT, LICENSEE may not reduce such efforts due to the competitive, regulatory or other impact of any other product or method that it owns, licenses or is developing or commercializing.

2.18 "ROYALTY PRODUCT" shall mean any PRODUCT [***], the manufacture, use or sale of which would infringe a VALID CLAIM of a POOLED PATENT in a country in the LICENSED TERRITORY and is either a LET7 PRODUCT, a MIR34 PRODUCT or a MIR16 PRODUCT.

(a) "LET7 PRODUCT" shall mean any PRODUCT in the FIELD which contains [***] of the let-7 microRNA (miRNA) family as the [***]. For the sake of clarity it is understood that LET7 PRODUCTS shall include, without limitation, any PRODUCT which comprises [***].

(b) "MIR34 PRODUCT" shall mean any PRODUCT in the FIELD which contains [***] of the miR-34 microRNA (miRNA) family as the [***] which may or may not be [***], provided that any additional miRNA may not be [***]. For the sake of clarity it is understood that MIR34 PRODUCTS shall include, without limitation, any PRODUCT which comprises [***].

(c) "MIR16 PRODUCT shall mean any PRODUCT in the FIELD which contains [***] of the miR-16 microRNA (miRNA) family as the [***] which may or may not be [***], provided that any [***] may not be a [***].

2.19 "SUBLICENSE REVENUES" shall mean the [***] actually received by LICENSEE or an AFFILIATE from any SUBLICENSEE in connection with the grant of or the option to a grant of a sublicense or other right, license, privilege or immunity under the POOLED PATENTS to make, have made, use, sell, have sold, distribute, import or export ROYALTY PRODUCTS, but excluding consideration included within NET SALES. SUBLICENSE REVENUE shall include without limitation [***], provided that SUBLICENSE REVENUE excludes specifically any amounts received by LICENSEE from a SUBLICENSEE (1) as [***], (2) [***], (3) as [***] LICENSEE.

2.20 "SUBLICENSEE" shall mean any THIRD PARTY sublicensed by LICENSEE to make, have made, use, sell, have sold, import or export any of the PRODUCTS.

2.21 "TERM" is defined in Article 3.4.

2.22 "THIRD PARTY(IES)" shall mean any person other than YALE and LICENSEE or their respective AFFILIATES.

2.23 "THIRD PARTY LICENSE(S)" is defined in Article 4.3(d).

2.24 "VALID CLAIM" shall mean (a) subject to subsection (b), an issued and unexpired claim of a POOLED PATENT existing as of the EFFECTIVE DATE so long as such claim shall not have been irrevocably abandoned or declared to be invalid in an unappealable decision of a court or other authority or competent jurisdiction, or (b), if within [***] after the EFFECTIVE DATE, a pending claim of a POOLED PATENT existing as of the EFFECTIVE DATE, provided that such pending claim [***] at the time of the relevant event; and further provided that, if such claim shall ultimately issue, such claim shall be considered a VALID CLAIM but [***] date of issuance. For the sake of clarity, it is understood that in order to

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qualify or potentially qualify as a VALID CLAIM, a claim of a POOLED PATENT must be [***].

Article 3. LICENSE GRANT AND TERM

3.1 Subject to all the terms and conditions of this Agreement, YALE hereby grants to LICENSEE an exclusive license, with the right to sublicense, under the POOLED PATENTS to the extent of YALE's rights therein, to make, have made, use, sell, have sold, import or export PRODUCTS in the FIELD in the LICENSED TERRITORY.

3.2 To the extent that any invention included within the POOLED PATENTS which is owned in whole or in part by YALE has been funded in whole or in part by the United States government ("Yale US Gov't Funded Pooled Patents"), the United States government retains certain rights in such invention as set forth in 35 U.S.C. §200-212 and all regulations promulgated thereunder, as amended, and any successor statutes and regulations (the "Federal Patent Policy"). As a condition of the license granted hereby, LICENSEE acknowledges and shall comply with all aspects of the Federal Patent Policy applicable to the Yale US Gov't Funded Pooled Patents, including the obligation that PRODUCTS used or sold in the United States which are covered by one of more Yale US Gov't Funded Pooled Patents at the time of such use or sale be manufactured substantially in the United States. Nothing contained in this Agreement obligates or shall obligate YALE to take any action that would conflict in any respect with its past, current or future obligations to the United States Government under the Federal Patent Policy with respect to Yale US Gov't Funded Pooled Patents.

3.3 The LICENSE is expressly made subject to YALE's reservation of the right to make, use and practice the POOLED PATENTS (but only to the extent of YALE's rights therein) and PRODUCTS (but only to the extent of YALE's rights therein) for research, clinical, teaching or other non-commercial purposes, and to grant to other academic research institutions non-exclusive licenses to the POOLED PATENTS (but only to the extent of YALE's rights therein) and PRODUCTS (but only to the extent of YALE's rights therein) for research, clinical, or teaching purposes and not for purposes of commercial development, use, manufacture or distribution. LICENSEE shall use REASONABLE COMMERCIAL EFFORTS to [***]. Nothing in this Agreement shall be construed to grant by implication, estoppel or otherwise any licenses under patents of YALE other than the POOLED PATENTS.

3.4 Unless terminated earlier as provided in Article 13, the term of this Agreement (the "TERM") shall commence on the EFFECTIVE DATE and shall automatically expire, on a country-by-country basis in the LICENSED TERRITORY, on the date on which the last VALID CLAIM of the POOLED PATENTS, whether owned in whole or in part by YALE or LICENSEE, in such country expires, lapses or is declared to be invalid by a non-appealable decision of

a court or other authority of competent jurisdiction through no fault or cause of LICENSEE, and LICENSEE'S payment obligations shall also terminate on such date in such country. This Agreement shall terminate in its entirety on the date on which the last VALID CLAIM of the POOLED PATENTS, whether owned in whole or in part by YALE or LICENSEE, in all countries of the LICENSED TERRITORY expires, lapses or is declared to be invalid by a non-appealable decision of a court or other authority of competent jurisdiction through no fault or cause of LICENSEE. Notwithstanding the foregoing, all of LICENSEE's

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payment obligations shall survive any early termination of this Agreement pursuant to Article 13 as set forth in Article 13.4(c), and such payment obligations shall expire until the earlier of the events to occur in Article 6.1.(d) (i) for each ROYALTY PRODUCT except that LICENSEE shall have no such payment obligations in the event of LICENSEE'S termination due to breach by YALE under Article 13.3(b) in which case the payment obligations shall terminate on the effective date of LICENSEE'S termination.

3.5 Except as expressly provided in this Agreement, under no circumstances will either party, as a result of this Agreement, obtain any interest in or any other right to any technology, know-how, patents, patent applications, materials or other intellectual or proprietary property of the other party.

Article 4. SUBLICENSES

4.1 In the event LICENSEE sublicenses the rights granted to it under this Agreement the provisions of Articles 4.2, 4.3 and 4.4 shall apply.

4.2 Any sublicense granted by LICENSEE shall include substantially the same definitions and provisions regarding Due Diligence, Confidentiality and Publicity, Reporting Requirements, Indemnification, Insurance and Warranties, Patent Notices and Use of YALE's Name, as are agreed to in this Agreement, and such other provisions as are needed to enable LICENSEE to comply with this Agreement. LICENSEE will provide YALE with a copy of each Sublicense Agreement promptly after execution. LICENSEE shall remain responsible for the enforcement of all sublicense agreements including but not limited to payment of any royalties other payments provided for hereunder, regardless of whether the terms of any sublicense provide for such amounts to be paid by the SUBLICENSEE directly to YALE.

4.3 LICENSEE shall pay [***] SUBLICENSEES to LICENSEE under a sublicense agreement. In addition, based on the particular ROYALTY PRODUCT, LICENSEE shall pay to YALE a certain percentage of any SUBLICENSE REVENUE from sublicenses [***] executed between LICENSEE and a THIRD PARTY [***] and a certain percentage of any SUBLICENSE REVENUE from sublicenses [***] executed between LICENSEE and a THIRD PARTY [***] as follows:

(a) [***] PRODUCTS, the manufacture, use or sale of which would infringe a

VALID CLAIM of one or more POOLED PATENTS [***] at the time of the execution of the sublicense between LICENSEE and a THIRD PARTY:

(i) [***]

(ii) [***]

(b) [***] PRODUCTS or [***] PRODUCTS, the manufacture, use or sale of which would infringe a VALID CLAIM of one or more POOLED PATENTS [***] at the time of the execution of the sublicense between LICENSEE and a THIRD PARTY:

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(i) [***]

(ii) [***]

(c) [***] PRODUCTS, [***], the manufacture, use or sale of which would infringe a VALID CLAIM of one or more POOLED PATENTS, [***] at the time of the execution of the sublicense between LICENSEE and a THIRD PARTY:

(i) [***]

(d) In the event that during the term of the Agreement, LICENSEE or its AFFILIATES are required to pay SUBLICENSE REVENUE for [***] PRODUCTS, and at least one of which is [***], or which are [***], the parties shall [***] PRODUCTS under this Article 4.3.

(e) for the sake of clarity, it is understood that, in the event the ROYALTY PRODUCT that is the subject of the SUBLICENSE REVENUE paid to LICENSEE is [***] at the time the event occurs which triggers the obligation for the relevant THIRD PARTY to pay SUBLICENSE REVENUE to LICENSEE, then [***].

4.4 LICENSEE agrees that it has sole responsibility to promptly:

(a) provide YALE with a copy of any amendments to sublicenses granted by LICENSEE under this Agreement and to notify YALE of termination of any sublicense; and

(b) provide copies of all reports prepared by SUBLICENSEES for LICENSEE under this Agreement.

Article 5. LICENSE ISSUE ROYALTY; LICENSE MAINTENANCE ROYALTY; MILESTONE FEES

5.1 During the TERM of this Agreement for as long as at least one ROYALTY PRODUCT is being researched, developed or sold by LICENSEE, its AFFILIATES and/or its SUBLICENSEES, the manufacture, use or sale of which is covered by one or more VALID CLAIMS of one or more POOLED PATENTS [***], LICENSEE agrees to pay to YALE an annual license maintenance royalty ("LMR") commencing on the first anniversary of the EFFECTIVE DATE and every anniversary thereafter until [***]. The LMR shall be [***].

5.2 (a) LICENSEE shall pay the following milestone fees to YALE for each [***] PRODUCT developed by LICENSEE, its SUBLICENSEES, or AFFILIATES, the manufacture, use or sale of which would infringe a VALID CLAIM of one or more POOLED PATENTS that is [***]:

(i) a non-refundable milestone fee of [***].

(ii) a non-refundable milestone fee of [***].

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(b) LICENSEE shall pay the following milestone fees to YALE for each [***] PRODUCT developed by LICENSEE, its SUBLICENSEES, or AFFILIATES, the manufacture, use or sale of which would infringe a VALID CLAIM of one or more POOLED PATENTS at the time the milestone occurs, [***]:

(i) a non-refundable milestone fee of [***].

(ii) a non-refundable milestone fee of [***].

(c) Each such milestone fee shall be due [***] for a [***] PRODUCT [***]. No milestone fee shall be owed to YALE for any PRODUCT under this Section 5.2 [***].

(d) for the sake of clarity, it is understood that, in the event the [***] PRODUCT that is the subject of the relevant milestone event is not covered at the time the milestone event occurs by one or more VALID CLAIMS, then LICENSEE shall not owe any payment to YALE for the achievement of such milestone.

5.3 [***].

Article 6. EARNED ROYALTIES: MINIMUM ROYALTY PAYMENTS

6.1 During the TERM of this Agreement, as partial consideration for the LICENSE, LICENSEE shall pay to YALE an earned royalty on NET SALES of ROYALTY PRODUCTS by LICENSEE or its SUBLICENSEES or AFFILIATES in any country of the LICENSED TERRITORY as follows ("EARNED ROYALTIES"):

(a) LICENSEE shall pay to YALE an EARNED ROYALTY of [***] of the NET SALES of each [***] PRODUCT in all countries of the LICENSED TERRITORY where there is at least one VALID CLAIM of one or more POOLED PATENTS [***] PRODUCT sold in such country at the time of the sale.

(b) LICENSEE shall pay to YALE an EARNED ROYALTY of [***] of the NET SALES of each [***] PRODUCT in all countries of the LICENSED TERRITORY where there is at least one VALID CLAIM of one or more POOLED PATENTS [***] PRODUCT sold in such country at the time of the sale, [***].

(c) LICENSEE shall pay to YALE an EARNED ROYALTY of [***] of the NET SALES of each [***] PRODUCT in all countries of the LICENSED TERRITORY where there is at least one VALID CLAIM of one or more POOLED PATENTS [***] PRODUCT sold in such country at the time of the sale.

(d) LICENSEE shall pay to YALE an EARNED ROYALTY of [***] of the NET SALES of each [***] PRODUCT in all countries of the LICENSED TERRITORY where there is at least one VALID CLAIM of one or more POOLED PATENTS [***] PRODUCT sold in such country at the time of the sale, [***].

provided that:

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(i) the obligation to pay an EARNED ROYALTY shall terminate, on a ROYALTY PRODUCT by ROYALTY PRODUCT and country by country basis in the LICENSED TERRITORY, upon the earlier of (a) the expiration or invalidation of the last VALID CLAIM of a POOLED PATENT that covers the particular ROYALTY PRODUCT in the particular country, or (b) the [***].

(ii) Notwithstanding the above, if during the term of the Agreement, LICENSEE, its AFFILIATES and/or its SUBLICENSEES are required to pay royalties on sales of ROYALTY PRODUCTS to a THIRD PARTY licensor in order to avoid infringing such THIRD PARTY's patent(s) in the development, manufacture and/or sale of ROYALTY PRODUCTS under this Agreement ("THIRD PARTY LICENSE(S)"), [***] under the THIRD PARTY LICENSES shall be deducted from the EARNED ROYALTY for ROYALTY PRODUCTS owed to YALE [***], provided that:

a In the event that the NET SALES of a particular ROYALTY PRODUCT which is the subject of the royalty obligation under THIRD PARTY LICENSES during such period is covered by one or more VALID CLAIMS of a POOLED PATENT [***], then (i) if the particular ROYALTY PRODUCT is [***] PRODUCT, the amount of royalties payable by the LICENSEE to YALE for the NET SALES for [***] of such NET SALES, and

(b) if the particular ROYALTY PRODUCT is a [***] PRODUCT, the amount of royalties payable by the LICENSEE to YALE for the NET SALES for [***] of such NET SALES,

b In the event that the NET SALES of a particular ROYALTY PRODUCT which is the subject of the royalty obligation under THIRD PARTY LICENSES during [***] is covered by one or more VALID CLAIMS of a POOLED PATENT, [***], then the amount of royalties payable by the LICENSEE to YALE for the NET SALES for such period shall [***] of such NET SALES.

6.2 LICENSEE shall pay all EARNED ROYALTIES accruing to YALE within [***] days from the end of each calendar quarter (March 31, June 30, September 30 and December 31), beginning in the first calendar quarter in which NET SALES occur.

6.3 During the TERM of this Agreement, LICENSEE agrees to pay YALE annual Minimum Royalty Payments ("MRP") with respect to [***] PRODUCTS [***], consistent with LICENSEE'S obligations under Article 6.2, above, commencing in [***] following the date of the first sale of a [***] PRODUCT that results in NET SALES ("FIRST NET SALES"). The MRP shall be in the annualized amount of [***] twelve (12) month periods following the FIRST NET SALES, and shall [***] to an annualized amount of [***] twelve (12) months periods following FIRST NET SALES and [***] every twelve (12) month period thereafter. LICENSEE shall continue to pay the MRP so long as any one of [***] PRODUCTS being manufactured, used or sold in the United States would infringe one or more VALID CLAIMS of any POOLED PATENTS in the United States [***] at the time of the sale, YALE shall fully credit all MRP made against any EARNED ROYALTIES on [***] PRODUCTS payable by LICENSEE in [***] twelve (12) month period.

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6.4 All EARNED ROYALTIES and other payments due under this Agreement shall be paid to YALE in United States Dollars. Conversion of foreign currency to U.S. dollars shall be made at the conversation rate existing in the United States in amounts based on the average rate of exchange for the reporting period as calculated on the Web site www.oanda.com. If the www.oanda.com Web site is not available, LICENSEE will use the conversion rate as reported in the Wall Street Journal on the last working day of the royalty period. If overdue, the royalties and any other payments due under this Agreement shall bear interest until payment at a [***] and YALE shall be entitled to [***]. The payment of such interest shall not foreclose YALE from exercising any other right it may have as a consequence of the failure of LICENSEE to make any payment when due.

Article 7. DUE DILIGENCE

7.1 LICENSEE shall use all REASONABLE COMMERCIAL EFFORTS after the EFFECTIVE DATE of this Agreement, at its sole expense, to diligently commercialize [***] the PRODUCTS,

7.2 Within [***] days after each anniversary of the EFFECTIVE DATE of this Agreement, LICENSEE shall provide a written report to YALE indicating LICENSEE's [***] developing and commercializing [***] PRODUCTS.

7.3 Subject to Article 7.4, and only for so long as [***] POOLED PATENTS which has a VALID CLAIM which would be infringed by a ROYALTY PRODUCT (i.e., a LET7 PRODUCT, a MIR34 PRODUCT or a MIR16 PRODUCT), YALE shall have the right to terminate the AGREEMENT with respect to the relevant ROYALTY PRODUCT category (but not with respect to any other ROYALTY PRODUCT category or any other PRODUCTS) as follows:

(a) If LICENSEE has [***] for [***] within [***] after the EFFECTIVE DATE, LICENSEE may extend such time period by [***] by paying YALE [***] within [***] days after the [***] anniversary of the EFFECTIVE DATE, and may further extend such time period by [***] by paying YALE [***] within [***] days after the [***] anniversary of the EFFECTIVE DATE, and may further extend such time period by [***] by paying YALE [***] within [***] days after the [***] anniversary of the EFFECTIVE DATE. In the event that LICENSEE has [***] within the relevant timeframe (or extension of such, as provided above), YALE may terminate this AGREEMENT with respect to [***], provided, however, that YALE has (1) notified LICENSEE in writing of YALE'S intention to terminate the AGREEMENT with respect to [***], (2) given LICENSEE [***] days to respond to YALE's written notice, and (3) if requested by LICENSEE, given LICENSEE [***] within such timeframe. If the [***] is beyond LICENSEE'S reasonable control, YALE shall [***] for an additional time extension to enable LICENSEE to [***], provided that [***].

(b) If LICENSEE does not demonstrate [***] for [***] PRODUCTS, YALE may terminate this AGREEMENT with respect to [***], provided, however, that YALE has (1) notified LICENSEE in writing of YALE's intention to terminate the AGREEMENT with respect to [***], (2) given LICENSEE [***] days to respond to YALE's written notice, and (3) if requested by LICENSEE, given LICENSEE [***] has not been demonstrated. If the

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demonstration of such [***] is beyond LICENSEE's reasonable control, YALE shall [***] for an additional time extension to enable LICENSEE to [***], provided that [***].

(c) If after [***], LICENSEE does not demonstrate [***] for [***] PRODUCTS, YALE may terminate this AGREEMENT with respect to [***] only, but not with respect to [***], provided, however, that YALE has (1) notified LICENSEE in writing of YALE's intention to terminate the AGREEMENT with respect to [***], (2) given LICENSEE [***] days to respond to YALE's written notice, and (3) if requested by LICENSEE, given LICENSEE [***] has not been demonstrated. If the demonstration of [***] is beyond LICENSEE'S reasonable control, YALE shall [***] for an additional time extension to enable LICENSEE to [***], provided that YALE [***].

7.4 LICENSEE and YALE may at any time mutually agree in writing to amend the date [***] under Article 7.3, above.

7.5 LICENSEE shall immediately notify YALE if at any time LICENSEE (a) abandons or suspends, or intends to abandon or suspend, its research, development or marketing of [***] PRODUCTS, or (b) fails to comply with its due diligence obligations under this Article for a period exceeding [***]. In such event, this Agreement shall terminate with respect to that category of ROYALTY PRODUCTS only, and not with respect to any other category of ROYALTY PRODUCTS or any other PRODUCTS.

Article 8. CONFIDENTIALITY AND PUBLICITY

8.1 Subject to the parties' rights and obligations pursuant to this Agreement, YALE and LICENSEE agree that during the TERM of this Agreement and for [***] years thereafter, each of them:

(a) will keep confidential and will cause their AFFILIATES and, in the case of LICENSEE, its SUBLICENSEES, to keep confidential, CONFIDENTIAL INFORMATION disclosed to it by the other party, by taking whatever action the party receiving the CONFIDENTIAL INFORMATION would take to preserve the confidentiality of its own CONFIDENTIAL INFORMATION, which in no event shall be less than reasonable care; and

(b) will only disclose that part of the other's CONFIDENTIAL INFORMATION to its officers, employees or agents that is necessary for those officers, employees or agents who need to know to carry out its responsibilities under this Agreement; and

(c) will not use the other party's CONFIDENTIAL INFORMATION other than as expressly set forth in this Agreement or disclose the other's CONFIDENTIAL INFORMATION to any THIRD PARTIES under any circumstance without advance written permission from the other party; and

(d) will, within [***] days of termination of this Agreement, return all the CONFIDENTIAL INFORMATION disclosed to it by the other party pursuant to this Agreement except for one copy which may be retained by the recipient for monitoring compliance with this Article 8.

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8.2 The obligations of confidentiality described above shall not pertain to that part of the CONFIDENTIAL INFORMATION that:

(a) was known to the recipient prior to the disclosure by the disclosing party; or

(b) is at the time of disclosure or has become thereafter publicly known through no fault or omission attributable to the recipient; or

(c) is rightfully given to the recipient from sources independent of the disclosing party; or

(d) is independently developed by the receiving party without use of or reference to the CONFIDENTIAL INFORMATION of the other party; or

(e) is required to be disclosed by law in the opinion of recipient's attorney, but only after the disclosing party is given prompt written notice and an opportunity to seek a protective order.

8.3 Except as required by law, neither party may disclose the financial terms of this Agreement without the prior written consent of the other party, however LICENSEE may disclose such financial terms to potential investors in LICENSEE who have agreed to respect the confidentiality of such information.

8.4 Except as otherwise provided in Article 8.3, no public announcement or other disclosure to THIRD PARTIES concerning the existence or terms of this AGREEMENT shall be made by either Party, except to the extent legally required, without first obtaining the written approval and agreement of the other Party on the nature and text of such public announcement or disclosure.

Article 9. REPORTS, RECORDS AND INSPECTIONS

9.1 LICENSEE shall, within [***] days after the calendar year in which NET SALES first occur, and within [***] days after each calendar quarter (March 31, June 30, September 30 and December 31) thereafter, provide YALE with a written report detailing the NET SALES and uses, if any, made by LICENSEE, its SUBLICENSEES and AFFILIATES of ROYALTY PRODUCTS during the preceding calendar quarter and calculating the payments due pursuant to Article 6. NET SALES of ROYALTY PRODUCTS shall be deemed to have occurred on the date of invoice for such above-mentioned PRODUCTS. Each such report shall be signed by an officer of LICENSEE (or the officer's designee), and must include:

(a) a calculation of NET SALES for the applicable reporting period in each country, including the gross invoice prices charged for the ROYALTY PRODUCTS and any permitted deductions made pursuant to Article 2.16;

(b) a calculation of total royalties or other payment due, including any exchange rates used for conversion; and

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(c) names and addresses of all SUBLICENSEES and the type and amount of any SUBLICENSE REVENUE received from each SUBLICENSEE.

9.2 LICENSEE and its SUBLICENSEES shall keep and maintain complete and accurate records and books containing an accurate accounting of all data in sufficient detail to enable verification of EARNED ROYALTIES and other payments under this Agreement. LICENSEE shall preserve such books and records for [***] years after the calendar year to which they pertain. Such books and records shall be open to inspection by an independent certified public accountant selected by YALE and agreed upon by LICENSEE, at YALE'S expense, during normal business hours upon [***] days prior written notice, solely for the purpose of verifying the accuracy of the reports and computations rendered by LICENSEE. In the event LICENSEE underpaid the amounts due to YALE with respect to the audited period by more than [***], LICENSEE shall pay the reasonable cost of such examination, together with the deficiency not previously paid, within [***] days of receiving notice thereof from YALE. Such audits will be scheduled at the mutual convenience of the parties and no more often than annually. YALE agrees that its aforementioned independent certified public accountant shall be under an obligation of confidentiality at least as restrictive as those confidentiality obligations set forth in this Agreement.

Article 10. PATENT PROTECTION

10.1 LICENSEE shall be responsible for all costs of filing, prosecution and maintenance of all United States patents and patent applications contained in POOLED PATENTS incurred after the EFFECTIVE DATE. LICENSEE shall be responsible for all costs of filing, prosecution and maintenance of all foreign patent applications and patents contained in the POOLED PATENTS provided that, to the extent such POOLED PATENTS are [***], LICENSEE shall bear such costs [***], and wherein such costs were incurred after the EFFECTIVE DATE.

10.2 YALE's ownership interest in the POOLED PATENTS shall remain with YALE and LICENSEE's ownership interest in the POOLED PATENTS shall remain with LICENSEE.

10.3 If LICENSEE does not agree to pay the expenses of filing, prosecuting or maintaining a POOLED PATENT owned in whole or in part by YALE in any country outside the United States, or fails to pay the expenses of filing, prosecuting or maintaining a POOLED PATENT owned in whole or in part by YALE in the United States, then [***]. In the event that LICENSEE decides to abandon or discontinue paying the expenses of filing, prosecuting or maintaining any of the POOLED PATENTS owned in whole or in part by LICENSEE, then LICENSEE shall promptly inform YALE of such decision, and in no event less than [***] days before any deadline necessary to maintain patent rights with that particular POOLED PATENT. YALE may then elect, at its sole discretion and its sole expense, to continue to prosecute or maintain such POOLED PATENT. In such event, LICENSEE shall provide reasonable cooperation to YALE at YALE's sole expense. Nothing in this Agreement shall be construed to grant (by implication, estoppel or otherwise) any licenses to YALE under any patents owned or controlled by LICENSEE including, without limitation, any POOLED PATENTS owned in whole or part by LICENSEE, whether or not abandoned by LICENSEE and/or subsequently prosecuted or maintained by YALE under this Article.

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10.4 Patent Prosecution/Maintenance

(a) All patent applications falling under the definition of POOLED PATENTS which are owned solely by YALE herein shall be prepared, prosecuted, filed and maintained by patent counsel chosen by YALE and reasonably acceptable to LICENSEE. Said patent counsel shall be ultimately responsible to YALE but YALE shall consult with LICENSEE on all matters associated with the preparation, prosecution, filing and maintenance of such patent applications though the ultimate decision making authority on such matters shall reside with YALE.

(b) All patent applications falling under the definition of POOLED PATENTS which are owned solely by LICENSEE or jointly by LICENSEE and YALE shall be prepared, prosecuted, filed and maintained by patent counsel chosen by LICENSEE and reasonably acceptable to YALE. Said patent counsel shall be ultimately responsible to LICENSEE, but LICENSEE shall consult with YALE on all matters associated with the preparation, prosecution, filing and maintenance of such patent applications though the ultimate decision making authority on such matters shall reside with LICENSEE. Notwithstanding the foregoing, in the case of POOLED PATENTS that are [***], LICENSEE shall not take any actions that [***] such POOLED PATENT, to the extent that such action would result in (i) [***] and/or (ii) the [***], without YALE's prior written approval, such approval not to be unreasonably withheld or delayed. In the event the parties do not agree on the appropriate action to be taken within [***] after submission of the proposed action to YALE by LICENSEE, the parties will submit the matter to an independent intellectual property attorney [***] within [***] days following the date the parties determine that they cannot agree on the action to be taken, provided that the parties shall use the same intellectual property attorney they used for the inventorship determination under Article 2.15 if such attorney is available and if he/she does not have, at that time, [***]. The attorney selected and engaged pursuant to the above shall be required to complete his/her analysis of the action to be taken within [***] of the attorney's engagement to the extent that such is practicable. The parties agree that the determination by such attorney [***] and is purely an effort to [***] and the parties further agree that [***]. The parties agree to [***] associated with the review by such attorney.

(c) YALE and LICENSEE shall instruct patent counsel respectively responsible to them to keep both YALE and LICENSEE fully informed of the progress of all patent applications and patents, and to give both YALE and LICENSEE reasonable opportunity to consult and comment on the type and scope of useful claims, the nature of supporting disclosures and the decisions as to filing and maintenance of resulting patent applications and issued patents.

(d) Neither party shall have any liability to the other party for damages, whether direct, indirect or incidental, consequential or otherwise, allegedly arising from such Party's good faith decisions, actions and omissions in connection with the preparation, prosecution, filing or maintenance of any patent application.

10.5 LICENSEE shall mark, and shall require SUBLICENSEES to mark, all ROYALTY PRODUCTS in the LICENSED TERRITORY with the numbers of POOLED PATENTS that cover the ROYALTY PRODUCTS (but this obligation shall apply only to the extent a POOLED PATENT is owned in whole or in part by YALE). Without limiting the

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foregoing, all ROYALTY PRODUCTS shall be marked in such a manner as to conform with the patent marking notices required by the law of any country where such ROYALTY PRODUCTS are made, sold, used or shipped, including, but not limited to, the applicable patent laws of that country.

Article 11. INFRINGEMENT AND LITIGATION

11.1 Each party shall promptly notify the other in writing in the event that it obtains knowledge of infringing activity by THIRD PARTIES, or is sued or threatened with an infringement suit, in any country in the LICENSED TERRITORY as a result of activities that concern the POOLED PATENTS and shall supply the other party with documentation of the infringing activities that it possesses.

11.2 During the TERM of this Agreement:

(a) LICENSEE shall have the first right and obligation to enforce the POOLED PATENTS against infringement or interference in the FIELD and in the LICENSED TERRITORY by THIRD PARTIES. This right and obligation includes bringing any legal action for infringement and defending any counter claim of invalidity or action of a THIRD PARTY for declaratory judgment for non-infringement or non-interference. If, in the reasonable opinion of LICENSEE'S and YALE's respective counsel, or if required by a court, YALE is required to be a named party to any such suit for standing purposes, LICENSEE may identify YALE as a party in the initial complaint or later join YALE as a party; provided, however, that (i) YALE shall not be the first named party in any such

action, (ii) the pleadings and any public statements about the action shall state that the action is being pursued by LICENSEE and that LICENSEE has joined YALE as a party; and (iii) LICENSEE shall keep YALE reasonably apprised of all developments in any such action. LICENSEE may settle such suits solely in its own name and solely at its own expense and through counsel of its own selection; provided, however, that no settlement that requires [***] shall be entered without YALE's prior written consent. Settlements that do not [***] may be made at the sole discretion of LICENSEE. LICENSEE shall bear the expense of such legal actions. Except for providing reasonable assistance, at the request and expense of LICENSEE, YALE shall have no obligation regarding the legal actions described in Article 11.2 unless required to participate by law. However, YALE shall have the right to participate in any such action through its own counsel and at its own expense. Any recovery related to POOLED PATENTS owned in whole or in part by YALE shall [***]. YALE shall receive [***] of any excess recovery over those expenses with respect [***]. With regard to POOLED PATENTS [***], YALE shall have [***] related thereto.

(b) In the event LICENSEE fails to initiate and pursue or participate in the actions described in Article 11.2(a) with respect to a POOLED PATENT owned in whole or in part by YALE within [***] days of (i) notification of infringement from YALE, or (ii) the date LICENSEE otherwise first becomes aware of an infringement, whichever is earlier, YALE shall have the right to initiate such legal action at its own expense and YALE may use the name of LICENSEE as party plaintiff to uphold the particular POOLED PATENT. In such case, LICENSEE shall provide reasonable assistance to YALE if requested to do so. With regard to POOLED PATENTS owned solely by YALE, YALE may settle such actions solely through its own counsel, provided that any such settlement does not involve cash or other valuable

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consideration to be paid by LICENSEE. Any recovery shall be [***], and secondly to [***] incurred as a result of [***]. With regard to POOLED PATENTS [***], YALE may not settle such actions without the prior written consent of LICENSEE, and any recovery shall be [***].

11.3 In the event LICENSEE is permanently enjoined from exercising its LICENSE under this Agreement pursuant to an infringement action brought by a THIRD PARTY, or if both LICENSEE and YALE elect not to undertake the defense or settlement of a suit alleging infringement for a period of [***] from notice of such suit, then either party shall have the right to terminate this Agreement in the country where the suit was filed with respect to the licensed patent following [***] written notice to the other party in accordance with the terms of Article 15.

Article 12. USE OF YALE'S NAME

12.1 LICENSEE shall not use the name "Yale" or "Yale University," nor any variation or adaptation thereof, nor any trademark, trade name or other designation owned by YALE, nor the names of any of its trustees, officers, faculty, students, employees or agents, for any purpose without the prior written consent of YALE in each instance, except that LICENSEE may state that it has licensed from YALE one or more of the patents and/or applications comprising the POOLED PATENTS.

Article 13. TERMINATION AND EXPIRATION

13.1 YALE shall have the right to terminate this Agreement after written notice to LICENSEE in the event LICENSEE:

(a) fails to make any material payment due and payable pursuant to this Agreement unless LICENSEE shall make all such payments (and all interest due on such payments under Article 6.4) within the thirty (30) day period after receipt of written notice from YALE; or

(b) commits a material breach of any other provision of this Agreement which is not cured (if capable of being cured) within the sixty (60) day period after receipt of written notice thereof from YALE, or upon receipt of such notice if such breach is not capable of being cured; or

(c) fails to obtain or maintain adequate insurance as described in Article 14, whereupon YALE may terminate this Agreement immediately upon written notice to LICENSEE.

13.2 This Agreement shall terminate automatically without any notice to LICENSEE in the event LICENSEE shall cease to carry on its business or becomes INSOLVENT, or a petition in bankruptcy is filed against LICENSEE and is consented to, acquiesced in or remains undismissed for sixty (60) days, or LICENSEE makes a general assignment for the benefit of creditors, or a receiver is appointed for LICENSEE.

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13.3 LICENSEE shall have the right to terminate this Agreement upon written notice to YALE:

(a) at any time on three (3) months' notice to YALE, provided LICENSEE is not in breach and upon payment of all amounts due YALE throughout the effective date of termination; or

(b) in the event YALE commits a material breach of any of the provisions of this Agreement and such breach is not cured (if capable of being cured) within the sixty (60) day period after receipt of written notice thereof from LICENSEE, or upon receipt of such notice if such breach is not capable of being cured,

13.4 Upon termination of this Agreement for any reason, all rights and licenses granted to LICENSEE under the terms of this Agreement are terminated. Upon such termination, and subject to Article 13.4, YALE may elect, in its sole discretion, to cause LICENSEE, its SUBLICENSEES, or AFFILIATES to immediately cease to manufacture or sell some or all ROYALTY PRODUCTS. Within sixty (60) days after the effective date of termination LICENSEE shall return to YALE:

(a) all materials relating to or containing the POOLED PATENTS and CONFIDENTIAL INFORMATION disclosed by YALE;

(b) the last report required under Article 7 or 9; and

(c) all payments incurred up to the effective date of termination. LICENSEE'S payment obligations under the Agreement shall terminate upon the effective date of termination except with respect to payments incurred prior to such effective date. Notwithstanding the foregoing, in the event that YALE elects to allow LICENSEE, its SUBLICENSEES, or AFFILIATES to continue to manufacture and sell ROYALTY PRODUCTS, LICENSEE (or its SUBLICENSEES or AFFILIATES) shall continue to pay royalties to YALE until the earlier of the events to occur in Article 6.1(d)(i) for each such ROYALTY PRODUCT.

Also upon termination of this Agreement, all sublicenses to the POOLED PATENTS that are granted by LICENSEE pursuant to this Agreement shall also terminate on the date of termination of this Agreement subject to Article 13.4(c). Notwithstanding the foregoing, each SUBLICENSEE shall have the continuing obligation to pay EARNED ROYALTIES to YALE on any ROYALTY PRODUCT (including those covered only by POOLED PATENTS owned solely by LICENSEE) after any such termination, and shall continue until the earlier of the events to occur in Article 6.1(d)(i) for each such ROYALTY PRODUCT.

13.5 Termination of this Agreement shall not affect any rights or obligations accrued prior to the effective date of such termination and specifically LICENSEE's obligation to pay all royalties and other payments specified by Articles 4, 5 and 6. The following provisions shall survive any termination: Article 3.4 (with respect to post early termination payment obligations), Article 3.5, Article 8.1 (for the time period set forth therein), Articles 8.2 through 8.4, the preservation and inspection obligations of Article 9, Article 10.2, Article 10.4(d), Article 11 (with respect to litigation initiated prior to the effective date of termination), Article 12,

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Article 13.4, this Article 13.5, Article 13.6, Article 13.8 (with respect to post early termination payment obligations), Article 14, Article 15, Article 16.1, and Article 17. In addition, any provision hereof required to interpret and enforce the parties' rights and obligations under this Agreement shall survive, but only to the extent required for the full observation and performance of this Agreement. The parties agree that claims giving rise to indemnification may arise after the TERM or termination of the LICENSE granted herein.

13.6 The rights provided in this Article 13 shall be in addition and without prejudice to any other rights which the parties may have with respect to any default or breach of the provisions of this Agreement.

13.7 Waiver by either party of one or more defaults or breaches shall not deprive such party of the right to terminate because of any subsequent default or breach.

13.8 The TERM of this Agreement shall expire as set forth in Article 3.4.

Article 14. INDEMNIFICATION; INSURANCE; NO WARRANTIES

14.1 LICENSEE shall defend, indemnify and hold harmless YALE, its trustees, directors, officers, employees, and agents and their respective successors, heirs and assigns against any and all liabilities, claims, demands, damages, judgments, losses and expenses of any nature of any THIRD PARTY, including without limitation legal expenses and attorneys' fees, arising out of any theory of liability (including without limitation tort, warranty, or strict liability) and the death, personal injury, or illness of any person or out of damage to any property related in any way to the rights granted under this Agreement; or resulting from the production, manufacture, sale, use, lease, or other disposition or consumption or advertisement of the PRODUCTS by LICENSEE, its AFFILIATES, SUBLICENSEES or any other transferees; or in connection with any statement, representation or warranty of LICENSEE, its AFFILIATES, SUBLICENSEES or any other transferees with respect to the PRODUCTS.

14.2 LICENSEE shall purchase and maintain in effect and shall require its SUBLICENSEES to purchase and maintain in effect a policy of commercial, general liability insurance to protect YALE with respect to events described in Article 14.1. Such insurance shall:

(a) list "YALE, its trustees, directors, officers, employees and agents" as additional insureds under the policy;

(b) provide that such policy is primary and not excess or contributory with regard to other insurance YALE may have;

(c) be endorsed to include product liability coverage in amounts no less than [***] per incident and [***] annual aggregate; and

(d) be endorsed to include contractual liability coverage for LICENSEE's indemnification under Article 14.1; and

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(e) by virtue of the minimum amount of insurance coverage required under Article 14.2(c), not be construed to create a limit of LICENSEE's liability with respect to its indemnification under Article 14.1.

14.3 By signing this Agreement, LICENSEE certifies that the requirements of Article 14.2 will be met on or before the earlier of (a) the date of FIRST SALE of any PRODUCT or (b) the date any PRODUCT is tested or used on humans, and will continue to be met thereafter. Upon YALE'S request, LICENSEE shall furnish a Certificate of Insurance and a copy of the current Insurance Policy to YALE. LICENSEE shall give [***] written notice to YALE prior to any cancellation of or material change to the policy.

14.4 (a) YALE MAKES NO, AND EXPRESSLY DISCLAIMS ALL, REPRESENTATIONS OR WARRANTIES THAT ANY CLAIMS OF THE POOLED PATENTS, ISSUED OR PENDING, ARE VALID, OR THAT THE MANUFACTURE, USE, SALE OR OTHER DISPOSAL OF THE PRODUCTS DOES NOT OR WILL NOT INFRINGE UPON ANY PATENT OR OTHER RIGHTS NOT VESTED IN YALE. LICENSEE MAKES NO, AND EXPRESSLY DISCLAIMS ALL, REPRESENTATIONS OR WARRANTIES THAT ANY CLAIMS OF THE POOLED PATENTS, ISSUED OR PENDING, ARE VALID, OR THAT THE MANUFACTURE, USE, SALE OR OTHER DISPOSAL OF THE PRODUCTS DOES NOT OR WILL NOT INFRINGE UPON ANY PATENT OR OTHER RIGHTS NOT VESTED IN LICENSEE.

(b) YALE MAKES NO, AND EXPRESSLY DISCLAIMS ALL, REPRESENTATIONS AND WARRANTIES WHATSOEVER WITH RESPECT TO THE POOLED PATENTS OR PRODUCTS, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. LICENSEE SHALL MAKE NO STATEMENTS, REPRESENTATION OR

WARRANTIES WHATSOEVER TO ANY THIRD PARTIES WHICH ARE INCONSISTENT WITH SUCH DISCLAIMER BY YALE. LICENSEE MAKES NO, AND EXPRESSLY DISCLAIMS ALL, REPRESENTATIONS AND WARRANTIES WHATSOEVER WITH RESPECT TO THE POOLED PATENTS OR PRODUCTS, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

(c) IN NO EVENT SHALL THE TRUSTEES, DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES OF EITHER YALE OR LICENSEE, BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES OF ANY KIND, INCLUDING ECONOMIC DAMAGE OR INJURY TO PROPERTY AND LOST PROFITS, REGARDLESS OF WHETHER LICENSEE OR YALE SHALL BE ADVISED, SHALL HAVE OTHER REASON TO KNOW, OR IN FACT SHALL KNOW OF THE POSSIBILITY OF THE FOREGOING.

IN NO EVENT SHALL THE TRUSTEES, DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES OF EITHER YALE OR LICENSEE, BE LIABLE FOR DAMAGES IN EXCESS OF AMOUNTS THAT SUCH PARTY HAS RECEIVED FROM THE OTHER PARTY UNDER THIS LICENSE.

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Article 15. NOTICES, PAYMENTS

15.1 Any payment, notice or other communication required by this Agreement (a) shall be in writing, (b) may be delivered personally or sent by reputable overnight courier with written verification of receipt or by registered or certified first class United States Mail, postage prepaid, return receipt requested, (c) shall be sent to the following addresses or to such other address as such party shall designate by written notice to the other party, and (d) shall be effective upon receipt:

FOR YALE:	FOR LICENSEE:
Managing Director	President & CEO
YALE UNIVERSITY	Mirna Therapeutics, Inc.
Office of Cooperative Research	2150 Woodward St., Suite 100
433 Temple Street	Austin, Texas 78744
New Haven, CT 06511	cc:

Article 16. LAWS, FORUM AND REGULATIONS

16.1 Any matter arising out of or related to this Agreement shall be governed by and in accordance with the substantive laws of the State of Connecticut, without regard to its conflicts of law principles, except where the federal laws of the United States are applicable and have precedence. Any dispute arising out of or related to this Agreement shall be brought in a court of competent jurisdiction in the State of Connecticut.

16.2 LICENSEE shall comply, and shall require its AFFILIATES and SUBLICENSEES to comply, with all foreign and United States federal, state, and local laws, regulations, rules and orders applicable to the testing, production, transportation, packaging, labeling, export, sale and use of the PRODUCTS. In particular, LICENSEE shall be responsible for assuring compliance with all United States export laws and regulations applicable to this LICENSE and LICENSEE'S activities under this Agreement.

Article 17. MISCELLANEOUS

17.1 This Agreement shall be binding upon and inure to the benefit of the parties and their respective legal representatives, successors and permitted assigns.

17.2 This Agreement constitutes the entire agreement of the parties relating to the POOLED PATENTS AND PRODUCTS including, without limitation, the ORIGINAL AGREEMENT and, to the extent inconsistent therewith, the Collaboration Agreement between the parties related to a project entitled [***] and effective as of February 22, 2011, and all prior representations, agreements and understandings, written or oral, are merged into it and are superseded by this Agreement.

17.3 The provisions of this Agreement shall be deemed separable, if any part of this Agreement is rendered void, invalid, or unenforceable, such determination shall not affect the validity or enforceability of the remainder of this Agreement unless the part or parts which are void, invalid or unenforceable shall substantially impair the value of the entire Agreement as to either party.

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17.4 Paragraph headings are inserted for convenience of reference only and do not form a part of this Agreement.

17.5 No person not a party to this Agreement, including any employee of any party to this Agreement, shall have or acquire any rights by reason of this Agreement. Nothing contained in this Agreement shall be deemed to constitute the parties partners with each other or any THIRD PARTY.

17.6 This Agreement may not be amended or modified except by written agreement executed by each of the parties. This Agreement is personal to LICENSEE and shall not be assigned by LICENSEE without the prior written consent of YALE, except that LICENSEE may assign this Agreement without prior written consent of YALE to an AFFILIATE, or to a THIRD PARTY that acquires from LICENSEE the line of business of which this Agreement is a part (whether by merger, acquisition of stock or assets, or otherwise), provided that LICENSEE gives YALE timely notice of the assignment. Any attempted assignment in contravention of this Article 17.6 shall be null and void and shall constitute a material breach of this Agreement.

17.7 LICENSEE, or any SUBLICENSEE or assignee, will not create, assume or permit to exist any lien, pledge, security interest or other encumbrance on this Agreement or any sublicense.

17.8 The failure of any party hereto to enforce at any time, or for any period of time, any provision of this Agreement shall not be construed as a waiver of either such provision or of the right of such party thereafter to enforce each and every provision of this Agreement.

17.9 This Agreement may be executed in any number of counterparts and any party may execute any such counterpart, each of which when executed and delivered shall be deemed to be an original and all of which counterparts taken together shall constitute but one and the same instrument,

{*signature page follows*}

IN WITNESS to their Agreement, the parties have caused this Agreement to be executed in duplicate originals by their duly authorized representatives.

YALE UNIVERSITY	MIRNA THERAPEUTICS, INC.
By: /s/ Jonathan Soderstrom	By: /s/ Paul Lammers
E. Jonathan Soderstrom, Ph.D.	Paul Lammers, M.D., M.Sc.
Its: Managing Director, Office of Cooperative Research	Its: President & CEO
Dated: 6 Feb 2014	Dated: Feb 03, 2014

Exhibit A

POOLED PATENTS

[***]

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Exhibit B — [***]

[***] shall mean the demonstration of [***] for LICENSED PRODUCTS, which shall be evidenced by [***]:

[***]

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LICENSE AGREEMENT

This agreement ("Agreement") is made by and between

University of Zurich
Rämistrasse 71
CH-8006 Zurich (Switzerland)

("UNIVERSITY")

and

Mirna Therapeutics, Inc.
2150 Woodward St., Suite 100
Austin, TX 78744 (USA)

("LICENSEE")

UNIVERSITY and LICENSEE are hereafter collectively referred to as "the Parties" or separately as a "Party".

This Agreement is effective on March 10, 2013 ("Effective Date").

RECITALS

WHEREAS, UNIVERSITY is owner of Patent Rights as defined below on [***] ("Invention");

WHEREAS, UNIVERSITY is desirous that the Invention be developed and exploited to the fullest possible extent so that its benefits can be enjoyed by the general public;

WHEREAS, LICENSEE wishes to obtain, and UNIVERSITY is willing to grant, an exclusive license to the Patent Rights on the terms and conditions set out below.

NOW, THEREFORE, the Parties agree:

ARTICLE 1. DEFINITIONS

All terms, as defined herein, shall have the same meanings in both their singular and plural forms.

1.1 "Affiliate" means any corporation or other business entity in which LICENSEE owns or controls, directly or indirectly, at least fifty percent (50%) of the outstanding stock or other voting rights entitled to elect directors, or in which LICENSEE is owned or controlled directly or indirectly by at least fifty percent (50%) of the outstanding stock or other voting rights entitled to elect directors.

1.2 "Sublicensee" means a third party to whom LICENSEE grants a sublicense of certain rights granted to LICENSEE under this Agreement.

1.3 "Field" means [***].

1.4 "Territory" means world-wide.

1.5 "Term" means the period of time beginning on the Effective Date and ending on the expiration date of the longest-lived Patent Rights.

1.6 "Patent Rights" means any of the following: the [***], and all national and regional phase applications resulting therefrom, and continuing applications thereof including divisions, substitutions, and continuations-in-part; any patents issuing on said applications including reissues, reexaminations and extensions; and any corresponding applications, patents and extensions in other countries.

1.7 "Licensed Product" means any composition, product or service which, in the course of manufacture, use, sale or importation, would be within the scope of one or more Valid Claims of Patent Rights.

1.8 "Valid Claim" means (a) any claim of an issued and unexpired patent within the Patents Rights which has not been held unenforceable or invalid by a court or other governmental agency of competent jurisdiction in an unappealed or unappealable decision, or (b) a claim in a pending patent application within the Patent Rights, which application was filed no more than [***].

1.9 "Net Sales" means the total of the gross receipts for sales of Licensed Products by or on behalf of LICENSEE or its Affiliates or its Sublicensees to third parties in bona fide arm's length transactions, and from leasing, renting, or otherwise making Licensed Products available to others without sale or other dispositions, whether invoiced or not, less the sum of the following actual and customary deductions where applicable and separately itemized on the invoice and actually paid or allowed: cash, trade, or quantity discounts; value added, sales or use taxes, and custom duties; transportation charges; or credits to customers because of rejections or returns.

For the avoidance of doubt Net Sales shall be calculated only once for the first sale of such Licensed Product by either LICENSEE, its Affiliates, or Sublicensees, as the case may be, to a third party other than an Affiliate or Sublicensee. The initial sale of Licensed Product by LICENSEE, its Affiliates, or Sublicensees to a

wholesaler shall be regarded as the first sale of the Licensed Product for the purpose of calculating Net Sales.

ARTICLE 2. GRANTS

2.1 **License.** Subject to the limitations set forth in this Agreement, UNIVERSITY hereby grants to LICENSEE, and LICENSEE hereby accepts, a license under Patent Rights to make and have made, use, sell, offer for sale, and import Licensed Products in the Field within the Territory and during the Term.

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The license granted herein is exclusive for Patent Rights and UNIVERSITY shall not grant to third parties a further license under Patent Rights in the Field, within the Territory and during the Term.

2.2 **Sublicense.**

(a) The license granted in Paragraph 2.1 includes the right of LICENSEE to grant sublicenses to third parties during the Term. The terms and conditions of any sublicense shall be in accordance with sound and reasonable business practices and any fees charged shall not be unreasonable for comparable rights.

(b) With respect to any sublicense granted pursuant to Paragraph 2.2(a), LICENSEE shall:

(1) [***] from a third party under a sublicense granted pursuant to Paragraph 2.2(a) without the express written consent of UNIVERSITY;

(2) to the extent applicable, include all of the rights of and obligations due to UNIVERSITY and contained in this Agreement;

(3) promptly notify UNIVERSITY of each sublicense agreement entered into and provide UNIVERSITY with a copy of such sublicense agreement; and

(4) collect and guarantee payment of all payments due, directly or indirectly, to UNIVERSITY from Sublicensees and summarize and deliver all reports due, directly or indirectly, to UNIVERSITY from Sublicensees.

(c) Upon termination of this Agreement in accordance with its terms for whatever reasons, UNIVERSITY, at its sole discretion, shall determine whether LICENSEE shall have to cancel or to assign to UNIVERSITY any and all sublicenses provided that sublicensee wishes to receive such direct license from the UNIVERSITY. Save as otherwise agreed by UNIVERSITY and the assignee, such assignment shall be contingent upon the express acceptance by the Sublicensee of all provisions of this Agreement.

2.3 **Reservation of Rights.** UNIVERSITY reserves the right to use the Invention and Patent Rights for educational and research purposes free of charge.

ARTICLE 3. CONSIDERATIONS

3.1 **Fees and Royalties.** In consideration for the license granted herein to LICENSEE under Patent Rights LICENSEE agrees to pay to UNIVERSITY:

(a) **license maintenance fees** of i) [***] on the [***] anniversary of the Effective Date, and ii) [***] on the [***] anniversary of the Effective Date, and iii) [***] on the [***] and annually thereafter on each anniversary of the Effective date;

(b) an **earned royalty** of [***] on Net Sales;

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(c) [***] of all **sublicense fees** received by LICENSEE from its Sublicensees that are not earned royalties.

All fees and royalty payments specified in this Paragraph 3.1 shall be paid by LICENSEE in accordance with the provisions of Paragraph 4.3.

If there are multiple, stacking royalties required to be paid by LICENSEE to any third party in order to exercise its rights hereunder to make, have made, use or sell the Licensed Products and the resulting aggregate royalty rate is [***], then the royalty rate under Section 3.1.(b) will be adjusted so that the combined royalty payments from LICENSEE to all of its licensors, including UNIVERSITY, does not exceed [***]. The royalty rate payable to UNIVERSITY will be reduced [***] to a rate determined by [***], provided, however, that in no event shall the royalty rate payable to LICENSEE be less than [***]. Notwithstanding the foregoing, if LICENSEE's agreement with any of such other licensors provides for a royalty proration formula based on an aggregate royalty rate [***], LICENSEE and UNIVERSITY will replace the aggregate royalty rate set forth in this Section with [***].

3.2 **Due Diligence.**

(a) LICENSEE (directly and/or through one or more Affiliates and/or Sublicensees) shall use commercially reasonable efforts to develop, manufacture and sell and market Licensed Products.

(b) If LICENSEE fails to perform any of its obligations specified in Paragraph 3.2(a), then UNIVERSITY shall [***]. If UNIVERSITY [***], the Parties shall [***]. In the absence of [***].

ARTICLE 4. REPORTS, RECORDS AND PAYMENTS

4.1 **Reports.**

(a) **Progress Reports.**

(1) Beginning January 1, 2015 and ending on the date of first commercial sale of a Licensed Product in the United States and Europe, LICENSEE shall submit to UNIVERSITY annual progress reports covering LICENSEE's (and each Affiliate's and Sublicensee's) [***]. Such reports shall include a summary of work completed; summary of work in progress; current schedule of anticipated events or milestones; market plans for introduction of Licensed Products; and summary of resources spent in the reporting period.

(2) LICENSEE shall also report to UNIVERSITY, in its immediately subsequent progress report, the date of first commercial sale of a Licensed Product in each country.

(b) **Royalty Reports.** After the First Commercial Sale of a Licensed Product anywhere in the world, LICENSEE shall submit to UNIVERSITY annual royalty reports on or before each March 31 of each year. Each royalty report shall cover LICENSEE's (and each Affiliate's and Sublicensee's) most recently completed calendar year and shall show:

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(1) the gross sales, deductions as provided in Paragraph 1.9, and Net Sales during the precedent calendar year and the royalties payable with respect thereto;

(2) the number of each type of Licensed Product sold on a country by country basis;

(3) sublicense fees and royalties received during the precedent calendar year;

(4) the method used to calculate the royalties; and

(5) the exchange rates used.

If no sales of Licensed Products have been made and no sublicense revenues have been received by LICENSEE during any reporting period, LICENSEE shall so report.

The royalty report shall be certified as correct by an authorized officer of LICENSEE.

4.2 **Records & Audits**.

(a) LICENSEE shall keep, and shall require its Affiliates and Sublicensees to keep, accurate and correct records of all Licensed Products manufactured, used, and sold, and sublicense fees received under this Agreement. Such records shall be retained by LICENSEE for at least [***] following a given reporting period.

(b) All records shall be available during normal business hours for inspection at the expense of UNIVERSITY by UNIVERSITY'S Internal Audit Department or by a public accountant selected by UNIVERSITY, reasonably acceptable to LICENSEE, and in compliance with the other terms of this Agreement for the sole purpose of verifying reports and payments. Such inspector shall not disclose to UNIVERSITY any information other than information relating to the accuracy of reports and payments made under this Agreement or other compliance issues. In the event that any such inspection shows an underpayment in excess of [***] for any twelve (12) month period, then LICENSEE shall pay the cost of the audit as well as any additional sum which would have been payable to UNIVERSITY had LICENSEE reported correctly, plus an interest charge at a rate of [***] per year on such additional sum. Such interest shall be calculated from the date on which the correct payment was due to UNIVERSITY up to the date when such payment is actually made by LICENSEE. For underpayment not in excess of [***] for any twelve (12) month period, LICENSEE shall pay the difference within [***].

(c) LICENSEE agrees to have an audit of sales and royalties conducted by an independent auditor at least [***] if annual Net Sales by LICENSEE, its Affiliates or Sublicensees are totaling [***]. The audit shall address, at a minimum, the amount of gross sales and Net Sales by or on behalf of LICENSEE during the audit period, the amount of royalties owed to UNIVERSITY under this Agreement, and whether the royalties owed have been paid to UNIVERSITY. A report certified by the auditor shall be submitted promptly by the auditor directly to UNIVERSITY on completion. [***].

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

4.3 **Payments.**

(a) All fees due to UNIVERSITY shall be paid to the following bank account, or to such other bank account specified in writing by UNIVERSITY to LICENSEE:

[***]

(b) Royalty Payments.

(1) Royalties shall accrue when Licensed Products are invoiced, or if not invoiced, when delivered to a third party or Affiliate.

(2) LICENSEE shall pay earned royalties annually on or before March 31 of each calendar year. Each such payment shall be for earned royalties accrued within LICENSEE's most recently completed calendar year.

(3) LICENSEE shall pay [***] as required by law and provide UNIVERSITY with appropriate documentation of such tax payment. LICENSEE shall use reasonable efforts to: (i) [***]; and (ii) [***].

(4) In the event that any patent or patent claim within Patent Rights is held invalid or unenforceable in a final decision by a patent office from which no appeal or additional patent prosecution has been or can be taken, or by a court of competent jurisdiction and last resort and from which no appeal has or can be taken, all obligation to pay royalties based solely on that patent or claim or any claim patentably indistinct therefrom shall cease as of the date of such final decision. LICENSEE shall not, however, be relieved from paying any royalties which (i) accrued before the date of such final decision, or (ii) are based on another patent or claim not involved and not affected by such final decision.

(c) Late Payments. In the event royalty, reimbursement and/or fee payments are not received by UNIVERSITY when due, LICENSEE shall pay to UNIVERSITY interest charges at a rate of [***] per year. Such interest shall accrue as from the date when such payment was due until the corresponding amount is actually received by UNIVERSITY.

ARTICLE 5. PATENT MATTERS

5.1 **Patent Prosecution and Maintenance.**

(a) LICENSEE, at its own expense, utilizing patent attorneys of its choice, shall be responsible for the filing, prosecution and maintenance of patent applications and patents within the Patent Rights in at least the following countries: [***]. Any such filings shall be in the name of UNIVERSITY and LICENSEE shall be acting in the best interest of UNIVERSITY in filing, prosecuting and maintaining the Patent Rights. LICENSEE, or its patent counsel shall provide UNIVERSITY on an ongoing basis with copies of all documentation relating to such filing, prosecution and maintenance and UNIVERSITY shall keep this documentation confidential.

(b) UNIVERSITY shall fully cooperate with LICENSEE in preparing, filing, prosecuting and maintaining any patent applications and patents in the Patent Rights. LICENSEE, or its patent counsel, shall consult with UNIVERSITY in all aspects of the preparation, filing, prosecution and maintenance of Patent Rights and shall provide

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UNIVERSITY sufficient opportunity to comment on any document that LICENSEE intends to file or to cause to be filed with the relevant intellectual property or patent office. LICENSEE, or its patent counsel, shall provide UNIVERSITY on an ongoing basis with copies of all documentation relating to such prosecution and UNIVERSITY shall keep this documentation confidential.

(c) LICENSEE shall apply for an extension of the term of any patent in Patent Rights if appropriate under the US Drug Price Competition and Patent Term Restoration Act and/or European, Japanese and other foreign counterparts thereof. LICENSEE shall prepare all documents for such applications, and UNIVERSITY shall execute such documents and take any other additional action as LICENSEE may reasonably request in connection therewith.

5.2 **Patent Infringement.**

(a) If LICENSEE learns of any substantial infringement of Patent Rights, LICENSEE shall so inform UNIVERSITY and provide UNIVERSITY with reasonable available evidence of such infringement. Neither Party shall notify a third party of the infringement of Patent Rights without the consent of the other Party, which consent shall not be unreasonably withheld. Both parties shall use reasonable efforts and cooperation to terminate infringement without litigation.

(b) LICENSEE may request UNIVERSITY to take legal action against such third party for the infringement of Patent Rights. Such request shall be made in writing and shall include [***]. If the infringing activity has not abated [***] following LICENSEE'S request, UNIVERSITY shall elect to or not to commence suit on its own account. UNIVERSITY shall give notice of its election in writing to LICENSEE by [***] after receiving notice of such request from LICENSEE. LICENSEE may thereafter bring suit for patent infringement at its own expense, if and only if UNIVERSITY elects not to commence suit and the infringement occurred in a jurisdiction where LICENSEE has an exclusive license under this Agreement. University shall give all necessary powers for instituting infringement proceedings. If LICENSEE elects to bring suit, UNIVERSITY may join that suit at its own expense. If however UNIVERSITY joins such suit on demand of LICENSEE because it is legally necessary, [***].

(c) Recoveries from actions brought pursuant to Paragraph 5.2(b) shall belong to the Party bringing suit except that in the event that LICENSEE brings suit for infringement of Patent Rights and an acceptable settlement is entered into or monetary damages are awarded in a final non-appealable judgment, UNIVERSITY shall be reimbursed for any amount which would have been due to UNIVERSITY under this Agreement if the products sold by the infringer actually had been sold by LICENSEE. Legal actions brought jointly by UNIVERSITY and LICENSEE and fully participated in by both shall be at the joint expense of the parties and all recoveries shall be shared jointly by them in proportion to the share of expense paid by each party.

(d) Each party shall cooperate with the other in litigation proceedings at the expense of the party bringing suit. Litigation shall be controlled by the party bringing the suit, except that UNIVERSITY may be represented by counsel of its choice in any suit brought by LICENSEE.

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5.3 **Patent Marking.** LICENSEE shall mark all Licensed Products made, used or sold under the terms of this Agreement, or their containers, in accordance with the applicable patent marking laws.

ARTICLE 6. GOVERNMENTAL MATTERS

Governmental Approval or Registration. If this Agreement or any associated transaction is required by the law of any nation to be either approved or registered with any governmental agency, LICENSEE shall assume all legal obligations to do so. LICENSEE shall notify UNIVERSITY if it becomes aware that this

Agreement is subject to any government reporting or approval requirement. LICENSEE shall make all necessary filings and pay all costs including fees, penalties, and all other out-of-pocket costs associated with such reporting or approval process.

ARTICLE 7. TERMINATION OF THE AGREEMENT

7.1 **Termination by UNIVERSITY.**

(a) If LICENSEE fails to perform or violates any term of this Agreement including but not limited to if LICENSEE is [***] in arrears with payment according to Paragraph 4.3, then UNIVERSITY shall be entitled to give LICENSEE written notice of default specifying the nature of default and requiring to cure it ("Notice of Default"). If LICENSEE fails to cure the default within sixty (60) days of the Notice of Default, then UNIVERSITY shall be entitled to terminate this Agreement and the license granted herein by sending a second written notice ("Notice of Termination") to LICENSEE. If such a Notice of Termination is sent to LICENSEE, this Agreement shall automatically terminate on the effective date of that notice. Termination shall not relieve LICENSEE of its obligation to pay any fees owed at the time of termination and shall not impair any accrued right of UNIVERSITY. In case of termination caused by default of payment all respective interest for default are to be paid additionally.

(b) UNIVERSITY shall have the right to terminate this Agreement by giving written notice, in the event of the filing by LICENSEE of a petition of bankruptcy or insolvency or both, or in the event of an adjudication that LICENSEE is bankrupt or insolvent or both, or after filing by LICENSEE of any petition or pleading asking reorganization, readjustment or rearrangement of its business under any law relating to bankruptcy or insolvency, or upon or after appointment of a receiver for all or substantially all of the property of LICENSEE or upon or after the making of any assignment for the benefit of creditors or upon or after the institution of any proceedings for the liquidation or winding-up of LICENSEE's business or for the termination of its corporate charter, and this Agreement shall terminate upon the date specified in such written notice.

(c) If at any time during the term of this Agreement LICENSEE directly or indirectly opposes or assists any third party to oppose the grant of letters patent or any patent application within the Patent Rights or disputes or directly or indirectly assists any third party to dispute the validity of any patent within the Patent Rights or any of the claims thereof, then UNIVERSITY shall be entitled at any time thereafter to terminate all or any of the licenses granted hereunder forthwith by written notice thereof to LICENSEE.

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(d) UNIVERSITY shall be entitled to terminate this Agreement immediately in accordance with Paragraph 3.2(b).

7.2 **Termination by Licensee.**

(a) LICENSEE shall have the right at any time and for any reason to terminate this Agreement upon a six (6) months written notice to UNIVERSITY. Said notice shall state LICENSEE's reason for terminating this Agreement.

(b) Any termination under Paragraph 7.2(a) shall not relieve LICENSEE of any obligation or liability accrued under this Agreement prior to termination or rescind any payment made to UNIVERSITY or action by LICENSEE prior to the time termination becomes effective. Termination shall not affect in any manner any rights of UNIVERSITY arising under this Agreement prior to termination.

7.3 **Survival on Termination.** Upon expiration or termination of the Agreement, the obligations which by their nature are intended to survive expiration or termination of the Agreement shall survive.

7.4 **Disposition of Licensed Products on Hand.** Upon termination of this Agreement, LICENSEE may dispose of all previously made or partially made Licensed Product within a period of [***] of the effective date of such termination provided that the sale of such Licensed Product by LICENSEE, its Sublicensees, or Affiliates shall be subject to the terms of this Agreement, including but not limited to the rendering of reports and payment of royalties required under this Agreement.

7.5 In the event of the termination of this Agreement, LICENSEE shall provide UNIVERSITY without delay with all necessary information, documents etc. relating to the application, filing and/or prosecution of the Patent Rights in order to prepare and effect a transfer to patent attorneys of UNIVERSITY's choice and take all actions at its own costs to ensure patent maintenance until termination becomes effective.

ARTICLE 8. LIMITED WARRANTY AND INDEMNIFICATION

8.1 **Limited Warranty.**

(a) UNIVERSITY warrants that it has the lawful right to grant this license.

(b) The license granted herein is provided "AS IS" and without WARRANTY OF MERCHANTABILITY or WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE or any other warranty, express or implied. UNIVERSITY makes no representation or warranty that the Licensed Product or the use of Patent Rights will not infringe any other patent or other proprietary rights.

(c) In no event shall UNIVERSITY be liable for any incidental, special or consequential damages resulting from exercise of the license granted herein or the use of the Invention or Licensed Product.

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(d) Nothing in this Agreement shall be construed as:

(1) a warranty or representation by UNIVERSITY as to the validity or scope of any Patent Rights;

(2) a warranty or representation that anything made, used, sold or otherwise disposed of under any license granted in this Agreement is or shall be free from infringement of patents of third parties;

(3) an obligation to bring or prosecute actions or suits against third parties for patent infringement except as provided in Paragraph 5.2 hereof.

8.2 **Indemnification.**

(a) LICENSEE shall indemnify, hold harmless and defend UNIVERSITY, its officers, employees, and agents and the inventors of the patents and patent applications in Patent Rights against any and all claims, suits, losses, damage, costs, fees, and expenses resulting from or arising out of exercise of this license or any sublicense. This indemnification shall include, but not be limited to, any product liability.

(b) LICENSEE, at its sole cost and expense, shall insure its activities in connection with the work under this Agreement and obtain, keep in force and maintain insurance or an equivalent program of self insurance. For the purposes of this provision, a general liability corporate insurance will be deemed sufficient.

(c) UNIVERSITY shall notify LICENSEE in writing of any claim or suit brought against UNIVERSITY in respect of which UNIVERSITY intends to invoke the provisions of this Article. LICENSEE shall keep UNIVERSITY informed on a current basis of its defense of any claims under this Article.

ARTICLE 9. USE OF NAMES AND TRADEMARKS, CONFIDENTIALITY

9.1 Nothing contained in this Agreement confers any right to use in advertising, publicity, or other promotional activities any name, trade name, trademark, or other designation of either Party hereto (including contraction, abbreviation or simulation of any of the foregoing).

9.2 UNIVERSITY may disclose to the inventors of the Invention the terms and conditions of this Agreement upon their request. If such disclosure is made, UNIVERSITY shall request the Inventors not disclose such terms and conditions to any other persons or entities.

9.3 UNIVERSITY may disclose the existence of this Agreement and the extent of the grant in Article 2 to third parties, but UNIVERSITY shall refrain from disclosing the financial terms of this Agreement to third parties, except where UNIVERSITY is required by law to do so.

ARTICLE 10. MISCELLANEOUS PROVISIONS

10.1 **Correspondence.** Any notice required to be given to either Party under this Agreement shall be deemed to have been properly given and effective:

(a) on the date of delivery if delivered in person or by facsimile, or

(b) five (5) business days after mailing if mailed by registered mail, postage paid, to the respective addresses given below, or to such other address as is designated by written notice given to the other Party.

If sent to LICENSEE:

Mirna Therapeutics, Inc.
2150 Woodward St., Suite 100
Austin, Texas 78744
United States of America
Tel.: +1-512-901-0900
Attn: Chief Executive Officer

If sent to UNIVERSITY:

University of Zurich, c/o Unitectra, Technology Transfer Office; Ref. UZ-12/394; Möhrlistrasse 23; CH 8006 Zurich (SWITZERLAND); Facsimile 0041 44 634 44 09

10.2 **Assignability.** This Agreement shall not be assigned by LICENSEE except:

(a) with the prior written consent of UNIVERSITY, which consent shall not be withheld unreasonably; or

(b) as part of a sale or transfer of substantially the entire business of LICENSEE relating to operations which concern this Agreement.

LICENSEE shall notify UNIVERSITY within ten (10) days of any assignment of this Agreement by LICENSEE pursuant to Section 10.3(b).

10.3 **No Waiver.** No waiver by either Party of any breach or default of any covenant or agreement set forth in this Agreement shall be deemed a waiver as to any subsequent and/or similar breach or default.

10.4 **Governing Laws and Jurisdiction.** THIS AGREEMENT SHALL BE INTERPRETED AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF SWITZERLAND. For any and all disputes arising from this Agreement, the Commercial Court of the Canton of Zurich shall have exclusive jurisdiction, subject to the appeal to the Swiss Supreme Court.

10.5 **Force Majeure.** A Party to this Agreement may be excused from any performance required herein if such performance is rendered impossible or unfeasible due to any catastrophe or other major event beyond its reasonable control, including, without limitation, war, riot, and insurrection; laws, proclamations, edicts, ordinances, or regulations; strikes, lockouts, or other serious labor disputes; and floods, fires, explosions, or other natural disasters. When such events have abated, the non-performing Party’s obligations herein shall resume.

10.6 **Headings.** The headings of the several sections are inserted for convenience of reference only and are not intended to be a part of or to affect the meaning or interpretation of this Agreement.

10.7 **Entire Agreement.** This Agreement embodies the entire understanding of the Parties and supersedes all previous communications, representations or understandings, either oral or written, between the Parties relating to the subject matter hereof.

10.8 **Amendments.** No amendment or modification of this Agreement shall be valid or binding on the parties unless made in writing and signed on behalf of each Party.

10.9 **Severability.** Should some or several provisions of this Agreement be ineffective or invalid, or should there be an omission in this Agreement, the effectiveness, respectively the validity of the remaining provisions shall not be affected thereby. An ineffective, respectively, invalid provision shall be replaced by the interpretation of the agreement which comes nearest to the meaning and the envisaged purpose of the ineffective respectively, invalid provision. The same applies in the case of a contractual gap.

10.10 The terms and conditions of this Agreement shall, at UNIVERSITY's sole option, be considered by UNIVERSITY to be withdrawn from LICENSEE's consideration and the terms and conditions of this Agreement, and the Agreement itself to be null and void, unless this Agreement is executed by the LICENSEE and a fully executed original is received by UNIVERSITY within sixty (60) days from the date of UNIVERSITY signature found below.

IN WITNESS WHEREOF, both UNIVERSITY and LICENSEE have executed this Agreement, in duplicate originals, by their respective and duly authorized officers on the day and year first above written.

UNIVERSITY

Date: 7.3.13

By: **Stefan Schnyder**
Director Finance, Human Resources
and Infrastructure

/s/ Stefan Schnyder
(Signature)

Date: 5.3.13

By: **Prof. Dr. Daniel Wyler**
Vice President

/s/ Daniel Wyler
(Signature)

LICENSEE (Mirna Therapeutics, Inc.)

Date: 18 March 2013

By: Dr. Paul Lammers
President and CEO

/s/ Paul Lammers
(Signature)

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

CANCER PREVENTION &
RESEARCH INSTITUTE OF TEXAS

STATE OF TEXAS
COUNTY OF TRAVIS

This **CANCER RESEARCH GRANT CONTRACT** ("**Contract**") is by and between the Cancer Prevention and Research Institute of Texas ("**CPRIT**"), hereinafter referred to as the "**INSTITUTE**", acting through its Executive Director, and **Mirna Therapeutics, Inc.**, hereinafter referred to as the "**RECIPIENT**", acting through its authorized signing official.

RECITALS

WHEREAS, pursuant to TEX. HEALTH & SAFETY CODE, Ch. 102, the INSTITUTE may make grants to public and private persons in this state for research into the causes and cures for all types of cancer in humans; facilities for use in research into the causes and cures for cancer; research to develop therapies, protocols, medical pharmaceuticals, or procedures for the cure or substantial mitigation of all types of cancer; and cancer prevention and control programs.

WHEREAS, Article III, Section 67 of the Texas Constitution expressly authorizes the State of Texas to sell general obligation bonds on behalf of the INSTITUTE and for the INSTITUTE to use the proceeds from the sale of the bonds for the purposes of cancer research and Prevention programs in this state.

WHEREAS, the INSTITUTE issued a request for applications for RFA R40-COMP1: Company Investment on or about November 2009.

WHEREAS, pursuant to TEX. HEALTH & SAFETY CODE § 102.251, and after a review by the INSTITUTE's scientific research and prevention program committees, the INSTITUTE's Executive Director has approved a Grant (defined below) to be awarded to the RECIPIENT.

WHEREAS, to ensure that the Grant provided to the RECIPIENT pursuant to this Contract is utilized in a manner consistent with Tex. Const. Article III, Section 67 and other laws, and in exchange for receiving such Grant, the RECIPIENT agrees to comply with certain conditions and deliver certain performance.

WHEREAS, the RECIPIENT and the INSTITUTE desire to set forth herein the provisions relating to the awarding of such monies and the disbursement thereof to the RECIPIENT.

IN CONSIDERATION of the Grant and the premises, covenants, agreements, and provisions contained in this Contract, the parties agree to the following terms and conditions:

Article I
DEFINITIONS

The following terms shall have the following meaning throughout this Contract and any Attachments and amendments. Other terms may be defined elsewhere in this Contract.

(1) **Collaborator** — any entity other than the RECIPIENT having one or more personnel participating in the Project and (a) designated as a collaborator in the application submitted by the RECIPIENT requesting the Grant funds awarded by the INSTITUTE, or (b) otherwise approved in writing as a collaborator by the INSTITUTE.

(2) **Contractor** — any person or entity, other than a Collaborator or the RECIPIENT (or their respective personnel), who is contracted by the RECIPIENT to perform activities for the Project.

(3) **Equipment** - an article of tangible, nonexpendable personal property having a useful life of more than one year and an acquisition cost of $5,000 or more per unit.

(4) **Grant** — the funding assistance authorized by TEX. HEALTH & SAFETY CODE, Ch. 102 in the amount specified in Section 2.01 and awarded by the INSTITUTE to the RECIPIENT to carry out the Project pursuant to the terms and conditions of this Contract.

(5) **Indirect Costs** — the expenses of doing business that are not readily identified with a particular grant, contract, project, function or activity, but are necessary for the general operation of the organization or the performance of the organization's activities.

(6) **Institute-Funded Activity** — all aspects of work conducted on or as part of the Project.

(7) **Non-Profit Organization** — a university or other institution of higher education or an organization of the type described in 501(c)(3) of the Internal Revenue Code of 1986, as amended (26 U.S.C. 501 (c)(3)) and exempt from taxation under 501 (a) of the Internal Revenue Code (26 U.S.C. 501 (a)) or any nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

(8) **Principal investigator/Program Director** — the individual designated by the RECIPIENT to direct the Project who is principally responsible and accountable to the RECIPIENT and the INSTITUTE for the proper conduct of the Project. References herein to "Principal Investigator/Program Director" include Co-Principal Investigators or Co-Program Directors as well. The Principal Investigator/Program Director and Co-Principal Investigators or Co-Program Directors are set forth on Attachment A.

(9) **Project** — the activities specified or generally described in the Scope of Work or otherwise in this Contract (including without limitation any of the Attachments to the Contract) that are approved by the INSTITUTE for funding, regardless of whether the INSTITUTE funding constitutes all or only a portion of the financial support necessary to carry them out.

(10) **Recipient Personnel** — The RECIPIENT's Principal Investigator/Program Director and RECIPIENT's employees and consultants working on the Project.

Article II
GRANT AWARD

Section 2.01 Award of Monies. In accordance with the provisions of this Contract, the INSTITUTE shall disburse the proceeds of the Grant to the RECIPIENT in an amount not to exceed **$10,297,454** to be used solely for the Project. This award is subject to compliance with the Scope of Work and demonstration of progress towards achievement of the milestones set forth in Section 2.02. The INSTITUTE, in its sole discretion, may award supplemental funding not to exceed ten percent (10%) of the total Grant amount based upon progress made by the RECIPIENT pursuant to the Scope of Work. This Grant is not intended to be a loan of money.

Section 2.02 Scope of Work and Milestones. The RECIPIENT shall perform the Project in accordance with this Agreement and as outlined in Application **RP101219** submitted by the RECIPIENT and approved by the INSTITUTE. The RECIPIENT shall conduct the Project within the State of Texas with Texas-based employees, Contractors and/or Collaborators unless otherwise specified in the Scope of Work or the Approved Budget. The INSTITUTE and the RECIPIENT hereby adopt the terms of Attachment A in their entirety, incorporate them as if fully set forth herein, and agree that the Project description, goals, timeline and milestones included as Attachment A accurately reflect the Scope of Work of the Project to be undertaken by the RECIPIENT (the "**Scope of Work**") and the milestones expected to be achieved. RECIPIENT and the INSTITUTE mutually agree that the outcome of scientific research is unpredictable and cannot be guaranteed. The RECIPIENT shall use commercially reasonable efforts to complete the goals of the Project pursuant to the timeline reflected in Attachment A and shall timely notify the INSTITUTE if circumstances occur that materially and adversely affect completion thereof. Modifications, if any, to the Scope of Work must be agreed to in writing by both parties as set forth in Section 2.06 "Amendments and Modifications" herein. Material changes to the Scope of Work include, but are not limited to, changes in key personnel involved with the Project, the site of the Project, and the milestones expected to be achieved.

Section 2.03 Contract Term. The Contract shall be effective as of **August 1, 2010** (the "**Effective Date**") and terminate on July 31, 2013 or in accordance with the Contract termination provisions set forth in Article VIII herein, whichever shall occur first (the "**Termination Date**"). Unless otherwise approved by the INSTITUTE as evidenced by written communication from the INSTITUTE to the RECIPIENT and appended to the Contract, Grant funds distributed pursuant to the Contract shall be expended no earlier than the Effective Date or subsequent to the Termination Date. If, as of the Termination Date, the RECIPIENT has not used Grant money awarded by the INSTITUTE for the Project and has not received approval from the INSTITUTE for a no cost extension to the contract term pursuant to Section 3.10 "Carry Forward of Unspent Funds and No Cost Extension" herein, then the RECIPIENT shall not be entitled to retain such unused Grant funds from the INSTITUTE, Certain obligations as set forth in Section 9.09 of this Contract shall extend beyond the Termination Date.

Section 2.04 Contract Documentation. The Contract between the INSTITUTE and the RECIPIENT shall consist of this final, executed Contract, including the following Attachments to the Contract, all of which are hereby incorporated by reference:

(a) Attachment A — Project Description, Goals and Timeline

(b) Attachment B — Approved Budget, including changes approved by the INSTITUTE subsequent to execution of the Contract.

(c) Attachment C — Assurances and Certifications

(d) Attachment D — Intellectual Property and Revenue Sharing

(e) Attachment E — Reporting Requirements

(f) Attachment F - Approved Amendments to Contract, excluding amendments to the Scope of Work and Milestones and/or budget amendments that are reflected in Attachments A and B, respectively.

Section 2.05 Entire Agreement. All agreements, covenants, representations, certifications and understandings between the parties hereto concerning this Contract have been merged into this written Contract. No prior or contemporaneous representation, agreement or understanding, express or implied, oral or otherwise, of the parties or their agents that may have related to the subject matter hereof in any way shall be valid or enforceable unless embodied in this Contract.

Section 2.06 Amendments and Modifications. Requested amendments and modifications to the Contract must be submitted in writing to the INSTITUTE for review and approval (such approval shall not be unreasonably withheld.) Amendments and modifications (including alterations, additions, deletions, assignments and extensions) to the terms of this Contract shall be made solely in writing and shall be executed by both parties. The approved amendment shall be reflected in Attachment A if it is change to the Scope of Work, or as part of Attachment B if it is a budget amendment, or as part of Attachment F for all other changes. No handwritten changes to this Contract shall be effective unless initialed and dated by authorized signatories of both parties.

Section 2.07 Relationship of the Parties. The RECIPIENT shall be responsible for the conduct of the Project that is the subject of this Contract and shall direct the activities and at all times be responsible for the performance of Recipient Personnel, Collaborators, Contractors and other agents. The INSTITUTE does not assume responsibility for the conduct of the Project or any Institute-Funded Activity that is the subject of this Contract. The INSTITUTE and the RECIPIENT shall perform their respective obligations under this Contract as independent contractors and not as agents, employees, partners, joint venturers, or representatives of the other party. Neither party is permitted to make representations or commitments that bind the other party.

Section 2.08 Subcontracting. Any and all subcontracts entered into by the RECIPIENT in relation to the performance of activities under the Project shall be in writing and shall be subject to the requirements of this Contract. Without in any way limiting the foregoing, the RECIPIENT shall enter into and maintain a written agreement with each such permitted Contractor with terms and conditions sufficient to ensure the RECIPIENT fully complies with the terms of this

Contract, including without limitation the terms set forth in Attachments C, D, and E. The RECIPIENT agrees that it shall be responsible to the INSTITUTE for the performance of and payment to any Contractor. Any reimbursements made by the RECIPIENT to a Contractor shall be made in accordance with the applicable provisions of TEX. GOV'T. CODE, Ch. 2251.

Section 2.09 Transfer or Assignment by the Recipient. This Contract is not transferable or otherwise assignable by the RECIPIENT, whether by operation of law or otherwise, without the prior written consent of the INSTITUTE, except as provided in this Section 2.09. Any such attempted transfer or assignment without the prior written consent of the INSTITUTE (except as provided in this Section 2.09) shall be null, void and of no effect. For purposes of this section, an assignment or transfer of this Contract by the RECIPIENT in connection with a merger, transfer or sale of all or substantially all of the RECIPIENT'S assets or business related to this Contract or a consolidation, change of control or similar transaction involving the RECIPIENT shall not be deemed to constitute a transfer or assignment, so long as such action does not impair or otherwise negatively impact the revenue sharing terms in Attachment D. Nothing herein shall be interpreted as superseding the requirement that the Project be undertaken in Texas with Texas-based employees.

If the Principal Investigator/Program Director leaves the employment of the RECIPIENT or is replaced by the RECIPIENT for any reason during the course of the Grant with someone who is not already designated a co-Principal Investigator/Program Director in Attachment A, the RECIPIENT shall notify the INSTITUTE prior to replacing the Principal Investigator/Program Director. Written approval by the INSTITUTE is required for the replacement of the Principal Investigator/Program Director with someone who is not already a co-Principal Investigator/Program Director in Attachment A, which approval shall not be unreasonably withheld, conditioned or delayed.

Section 2.10 Representations and Certifications. The RECIPIENT represents and certifies to the best of its knowledge and belief to the INSTITUTE as follows:

(a) It has legal authority to enter into, execute, and deliver this Contract, and all documents referred to herein, and it has taken all corporate actions necessary to its execution and delivery of such documents;

(b) It will comply with all of the terms, conditions, provisions, covenants, requirements, and certifications in this Contract, and all other documents incorporated herein by reference;

(c) It has made no material false statement or misstatement of fact in connection with this Contract and its receipt of the Grant, and all of the information it previously submitted to the INSTITUTE or that it is required under this Contract to submit to the INSTITUTE relating to the Grant or the disbursement of any of the Grant is and will be true and correct at the time such statement is made;

(d) It is in compliance in all material respects with provisions of its charter and of the laws of the State of Texas, and of the laws of the jurisdiction in which it was formed, and (i) there are no actions, suits, or proceedings pending, or threatened, before any judicial body or governmental authority against or affecting its ability to enter into this Contract, or any document referred to herein, or to perform any of the material acts required of it in such documents and (ii) it is not in default with respect to any order, writ, injunction, decree, or demand of any court or any governmental authority which would impair its ability to enter into this Contract,

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or any document referred to herein, or to perform any of the material acts required of it in such documents;

(e) Neither the execution and delivery of this Contract or any document referred to herein, nor compliance with any of the terms, conditions, requirements, or provisions contained in this Contract or any documents referred to herein, is prevented by, is a breach of, or will result in a breach of, any term, condition, or provision of any agreement or document to which it is now a party or by which it is bound; and

(f) It shall furnish such satisfactory evidence regarding the representations and certifications described herein as may be required and requested by the INSTITUTE from time to time.

Section 2.11 Reliance upon Representations. By awarding the Grant and executing this Contract, the INSTITUTE is relying, and will continue to rely throughout the term of this Contract, upon the truthfulness, accuracy, and completeness of the RECIPIENT's written assurances, certifications and representations. Moreover, the INSTITUTE would not have entered into this Contract with the RECIPIENT but for such written assurances, certifications and representations. The RECIPIENT acknowledges that the INSTITUTE is relying upon such assurances, certifications and representations and acknowledges their materiality and significance.

Section 2.12 Contingent upon Availability of Grant Funds. This Contract is contingent upon funding being available for the term of the Contract and the RECIPIENT shall have no right of action against the INSTITUTE in the event that the INSTITUTE is unable to perform its obligations under this Contract as a result of the suspension, termination, withdrawal, or failure of funding to the INSTITUTE or lack of sufficient funding of the INSTITUTE for this Contract. If funds become unavailable to the INSTITUTE during the term of the Contract, Section 8.01(c) shall apply. For the sake of clarity, and except as otherwise provided by this Contract, if this Contract is not funded, then both parties are relieved of all of their obligations under this Contract. The INSTITUTE acknowledges and agrees that the Project is a multiyear project subject to Tex. Health & Safety Code, Chr. 102, Section 102257.

Section 2.13 Confidentiality of Documents and Information. In connection with work contemplated for the Project or pursuant to complying with various provisions of this Contract, the RECIPIENT may disclose its confidential business, financial, technical, scientific information and other information to the INSTITUTE ("Confidential Information"). To assist the INSTITUTE in identifying such information, the RECIPIENT shall mark or designate the information as "confidential," provided however that the failure to so designate does not operate as a waiver to protections provided by applicable law or this Contract. The INSTITUTE shall use no less than reasonable care to protect the confidentiality of the Confidential Information to the fullest extent permissible under the Texas Public Information Act, Texas Government Code, Chapter 552 (the "**TPIA**"), and, except as otherwise provided in the TPIA to prevent the disclosure of the Confidential Information to third parties for a period of time equal to three (3) years from the termination of the contract, unless the INSTITUTE and the RECIPIENT agree

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in writing to extend such time period, provided that this obligation shall not apply to information that:

(a) was in the public domain at the time of disclosure or later became part of the public domain through no act or omission of the INSTITUTE in breach of this Contract;

(b) was lawfully disclosed to the INSTITUTE by a third party having the right to disclose it without an obligation of confidentiality;

(c) was already lawfully known to the INSTITUTE without an obligation of confidentiality at the time of disclosure;

(d) was independently developed by the INSTITUTE without using or referring to the RECIPIENT's Confidential Information; or

(e) is required by law or regulation to be disclosed.

The INSTITUTE shall hold the Confidential Information in confidence, shall not use such Confidential Information except as provided by the terms of this Contract, and shall not disclose such Confidential Information to third parties without the prior written approval of the RECIPIENT or as otherwise allowed by the terms of the Contract. Subject in all respects to the terms of this Contract and the TPIA, the INSTITUTE has the right to use and disclose the Confidential Information reasonably in connection with the exercise of its rights under the Agreement.

In the event that the INSTITUTE is requested or required (by oral questions, interrogatories, requests for information or documents in legal proceedings, subpoena, civil investigative demand or other similar process by a court of competent jurisdiction or by any administrative, legislative, regulatory or self-regulatory authority or entity) to disclose any Confidential Information, the INSTITUTE shall provide the RECIPIENT with prompt written notice of any such request or requirement so that the RECIPIENT may seek a protective order or other appropriate remedy. If, in the absence of a protective order or other remedy, the INSTITUTE is nonetheless legally compelled to make any such disclosure of Confidential Information to any person, the INSTITUTE may, without liability hereunder, disclose only that portion of the Confidential Information that is legally required to be disclosed, provided that the INSTITUTE will use reasonable efforts to assist the RECIPIENT, at the RECIPIENT's expense, in obtaining an appropriate protective order or other reliable assurance that confidential treatment will be accorded the Confidential Information. To the extent that such Confidential Information does not become part of the public domain by virtue of such disclosure, it shall remain Confidential Information hereunder.

Article III
DISBURSEMENT OF GRANT AWARD PROCEEDS

Section 3.01 **Payment of Grant Award Proceeds**. The INSTITUTE will advance Grant award proceeds in an amount and schedule as provided in Attachment B.

Section 3.02 **Allowable Expenses**. The RECIPIENT shall use Grant proceeds only for allowable expenses consistent with applicable state law and agency administrative rules. Allowable expenses for the Project(s) shall be only as outlined in the Approved Budget and any modifications to same.

Section 3.03 **Travel Expenses**. Reimbursement for travel expenditures shall be in accordance with the Approved Budget. Prior written approval from the INSTITUTE must be obtained before travel that exceeds the amount included in the Approved Budget commences. Failure to obtain such prior written approval shall result in such excess travel costs constituting expenses that may not be taken into account for the purposes of calculating expenditure of Grant funds under this Contract.

Section 3.04 **Budget Modifications**. The total Approved Budget and the assignment of costs may be adjusted based on implementation of the Scope of Work, spending patterns, and unexpended funds, but only by an amendment to the Approved Budget. In no event shall an amendment to the Approved Budget result in payments in excess of the aggregate amount specified in Section 2.01 "Award of Monies" or in approved supplemental funding for the Project, if any. The RECIPIENT may make transfers between or among lines within budget categories without prior written approval provided that:

(a) The total dollar amount of all changes of any single line item within budget categories (individually and in the aggregate) is [***] of the total Approved Budget;

(b) The transfer will not increase or decrease the total Approved Budget;

(c) The transfer will not materially change the nature, performance level, or Scope of Work of the Project; and

(d) The RECIPIENT submits a revised copy of the Approved Budget including a narrative justification of the changes prior to incurring costs in the new category.

All other budget changes or transfers require the INSTITUTE's express prior written approval. Transfer of funds between categories in the Project's Approved Budget may be allowed if requests are in writing, fit within the Scope of Work and the total Approved Budget, are beneficial to the achievement of the objectives of the Project, and appear to be an efficient, effective use of the INSTITUTE'S funds.

Section 3.05 **Withholding Payment**. The INSTITUTE may withhold Grant award proceeds from the RECIPIENT if required Financial Status Reports (Form 269a) are not on file for previous quarters or for the final period, if material program requirements are not met and remain uncured after a reasonable time period to cure, if the RECIPIENT is in breach of any material term of this Contract, or in accordance with provisions of this Contract as well as applicable state or federal laws, regulations or administrative rules, and the breach remains uncured after a reasonable time period to cure. The INSTITUTE shall have the right to withhold all or part of any future payments to the RECIPIENT to offset any prior advance payments made to the RECIPIENT for ineligible expenditures that have not been refunded to the INSTITUTE by the RECIPIENT

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Section 3.06 **Grant Funds as Supplement to Budget**. The RECIPIENT shall use the Grant proceeds awarded pursuant to this Contract to supplement its overall budget. These funds will in no event supplant existing funds currently available to the RECIPIENT that have been previously budgeted and set aside for

the Project. The RECIPIENT will not bill the INSTITUTE for any costs under this Contract that also have been billed or should have been billed to any other funding source.

Section 3.07 Buy Texas. The RECIPIENT shall apply good faith efforts to purchase goods and services from suppliers in Texas to the extent reasonably possible, to achieve a goal of more than [***] of such purchases from suppliers in Texas.

Section 3.08 Historically Underutilized Businesses. The RECIPIENT shall use reasonable efforts to purchase materials, supplies or services from a Historically Underutilized Business (HUB). The Texas Procurement and Support Services website will assist in finding HUB vendors (http://www.window.state.tx.us/procurement.) The RECIPIENT shall complete a HUB report with each annual report submitted to the INSTITUTE in accordance with Attachment E.

Section 3.09 Limitation on Use of Grant Award Proceeds to Pay Indirect Costs. The RECIPIENT shall not spend more than [***] of the Grant award proceeds for Indirect Costs,

Section 3.10 Carry Forward of Unspent Funds and No Cost Extension. The RECIPIENT may carry forward unspent funds into the budget for the next year. Carryover of unspent funds in excess of [***] of the annual budget must be specifically approved in writing by the INSTITUTE. Upon request, the INSTITUTE may approve a no cost extension for the Contract for a period not to exceed [***] after the Termination Date so long as the Contract is in good fiscal and programmatic standing and additional time beyond the Termination date is required to ensure adequate completion of the approved project. All terms and conditions of the Contract shall continue during any extension period and if such extension is approved, notwithstanding Section 2.03, all references to the "Termination Date" shall be deemed to mean the date of expiration of such extension period.

Article IV
AUDITS AND INSPECTIONS

Section 4.01 Record Keeping. The RECIPIENT, each Collaborator and each Contractor whose costs are funded in all or in part by the Grant shall maintain or cause to he maintained books, records, documents and other evidence (electronic or otherwise) pertaining in any way to its performance under and compliance with the terms and conditions of this Contract ("**Records**"). The RECIPIENT, each Collaborator and each Contractor shall use, or shall cause the entity which is maintaining such Records to use generally accepted accounting principles in the maintenance of such Records, and shall retain or require to be retained all of such Records for a period of [***] from the Termination Date of the Contract.

Section 4.02 Audits. Upon request and with reasonable notice, the RECIPIENT, [***] shall allow, or shall cause the entity which is maintaining such items to allow, the INSTITUTE, or auditors working on behalf of the INSTITUTE, including the State Auditor and/or the Comptroller of Public Accounts for the State of Texas, to review, inspect, audit, copy or abstract

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all of its Records during regular working hours. Acceptance of funds directly under the Contract or indirectly through a subcontract under the Contract constitutes acceptance of the authority of the INSTITUTE, or auditors working on behalf of the INSTITUTE, including the State Auditor and/or the Comptroller of Public Accounts, to conduct an audit or investigation in connection with those funds for a period of [***] from the Termination Date of the Contract.

Notwithstanding the foregoing, any RECIPIENT expending $500,000 or more in federal or state awards during its fiscal year shall obtain either an annual single audit or a program specific audit. A RECIPIENT expending funds from only one federal program (as listed in the Catalog of Federal Domestic Assistance (CFDA) or one state program may elect to obtain a program specific audit in accordance with Office of Management and Budget (OMB) Circular A-133 or with the State of Texas Uniform Grant Management Standards (UGMS). A single audit is required if funds from more than one federal or state program are spent by the RECIPIENT. The audited time period is the RECIPIENT's fiscal year, not the INSTITUTE funding period.

Section 4.03 Inspections. In addition to the audit rights specified in Section 4.02 "Audits", the INSTITUTE shall have the right to conduct periodic onsite inspections within normal working hours and on a day and a time mutually agreed to by the parties, to evaluate the Institute-Funded Activity. The RECIPIENT shall fully participate and cooperate in any such evaluation efforts.

Section 4.04 On-going Obligation to Submit Requested Information. The RECIPIENT shall, submit other information related to the Grant to the INSTITUTE as may be reasonably requested from time-to-time by the INSTITUTE, by the Legislature or by any other funding or regulatory bodies covering the RECIPIENT's activities under this Contract.

Section 4.05 Duty to Resolve Deficiencies. If an audit and/or inspection under this Article IV finds there are deficiencies that should be remedied, then the RECIPIENT shall resolve and/or cure such deficiencies within a reasonable time frame specified by the INSTITUTE. Failure to do so shall constitute an Event of Default pursuant to Section 8.03 "Event of Default." Upon the RECIPIENT'S request, the parties agree to negotiate in good faith, specific extensions so that the RECIPIENT can cure such deficiencies.

Section 4.06 Repayment of Grant Proceeds for improper Use. In no event shall RECIPIENT retain Grant funds that have not been used by the RECIPIENT for purposes for which the Grant was intended or in violation of the terms of this Contract. The RECIPIENT shall repay any portion of Grant proceeds used by the RECIPIENT for purposes for which the Grant was not intended, as determined by the final results of an audit conducted pursuant to the provisions of this Contract. Unless otherwise expressly provided for in writing and appended to this Contract, the repayment shall be made to the INSTITUTE no later than forty-five (45) days upon a written request by the INSTITUTE specifying the amount to be repaid and detailing the basis upon which such request is being made and the amount shall include interest calculated at an amount not to exceed five percent (5%) annually. The RECIPIENT may request that the INSTITUTE waive the interest, subject in all cases to the INSTITUTE'S sole discretion.

Section 4.07 Repayment of Grant Proceeds for Relocation Outside of Texas. The RECIPIENT shall repay the INSTITUTE all Grant proceeds disbursed to RECIPIENT in the

event that RECIPIENT [***] outside of the State during the Contract term or within [***] after the final payment of the Grant funds is made by the INSTITUTE.

Article V
ASSURANCES AND CERTIFICATIONS

Adoption of Attachment C. The INSTITUTE and the RECIPIENT hereby adopt the terms of Attachment C in their entirety, incorporate them as if fully set forth herein, and agree to perform and be bound by all such terms.

Article VI
INTELLECTUAL PROPERTY AND REVENUE SHARING

Adoption of Attachment D. The INSTITUTE and the RECIPIENT hereby adopt the terms of Attachment D in their entirety, incorporate them as if fully set forth herein, and agree to perform and be bound by all such terms.

Article VII
REPORTING

Adoption of Attachment E. The INSTITUTE and the RECIPIENT hereby adopt the terms of Attachment E in their entirety, incorporate them as if fully set forth herein, and agree to perform and be bound by all such terms.

Article VIII
EARLY TERMINATION AND EVENT OF DEFAULT

Section 8.01 **Early Termination of Contract**. This Contract may be terminated prior to the Termination Date specified in Section 2.03 "Contract Term" by:

(a) Mutual written consent of all parties to this Contract; or

(b) The INSTITUTE for an Event of Default (defined in Section 8.03) by the RECIPIENT; or

(c) The INSTITUTE if allocated funds should become legally unavailable during the Contract period and the INSTITUTE is unable to obtain additional funds for such purposes; or

(d) The RECIPIENT for convenience.

Section 8.02 **Repayment of Grant Proceeds upon Early Termination**. The INSTITUTE may require the RECIPIENT to repay any unused portion of the disbursed Grant proceeds in the event of early termination under 8.01 (d) above or under Section 8.01(b) above, to the extent such Event of Default resulted from Grant funds being expended in violation of this Contract. To the extent that the INSTITUTE exercises this option, the INSTITUTE shall provide written notice to the RECIPIENT stating the amount to be repaid, applicable interest calculated not to exceed [***] annually, and the schedule for such repayment. The RECIPIENT may request that

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the INSTITUTE waive the interest, subject in all cases to the INSTITUTE'S sole discretion. In no event shall the RECIPIENT retain Grant funds that have not been used by the RECIPIENT for purposes for which the Grant was intended.

Section 8.03 **Event of Default**. The following events shall, unless expressly waived in writing by the INSTITUTE or fully cured by the RECIPIENT pursuant to the provisions herein, constitute an event of default (each, an "**Event of Default**"):

(a) The RECIPIENT's failure, in any material respect, to conduct the Project in accordance with the approved Scope of Work and to demonstrate progress towards achieving the milestones set forth in Section 2.02;

(b) The RECIPIENT's failure to conduct the Project within the State of Texas to the extent required under this Contract unless as otherwise specified in the application, Scope of Work or Approved Budget;

(c) The RECIPIENT's failure to fully comply, in any material respect, with any provision, term, condition, covenant, representation, certification, or warranty contained in this Contract or any other document incorporated herein by reference;

(d) The RECIPIENT's failure to comply with any applicable federal or state law, administrative rule, regulation or policy with regard to the conduct of the Project;

(e) The RECIPIENT's material misrepresentation or false covenant, representation, certification, or warranty made by the RECIPIENT herein, in the Grant application, or in any other document furnished by the RECIPIENT pursuant to this Contract that was false or misleading at the time that it was made; or

(f) The RECIPIENT ceases its business operations, has a receiver appointed for all or substantially all of its assets, makes a general assignment for the benefit of creditors, is declared insolvent by a court of competent jurisdiction or becomes the subject, as a debtor, of a proceeding under the federal bankruptcy code, which such proceedings are not dismissed within ninety (90) days after filing.

Section 8.04 **Notice Required**. If the RECIPIENT intends to terminate pursuant to Section 8.01(d) "Early Termination of Contract", it shall provide written notice to the INSTITUTE pursuant to the notice provisions of Section 9.21 "Notices" no later than thirty (30) days prior to the intended date of termination.

If the INSTITUTE intends to terminate for an Event of Default under Section 8.01(b) by the RECIPIENT, as described in Section 8.03 "Event of Default", the INSTITUTE shall provide written notice to the RECIPIENT pursuant to Section 9.21 "Notices" and shall include a reasonable description of the Event of Default

and, if applicable, the steps necessary to cure such Event of Default. Upon receiving notice from the INSTITUTE, the RECIPIENT shall have thirty (30) days beginning on the day following the receipt of notice to cure the Event of Default. Upon request, the INSTITUTE may provide an extension of time to cure the Event of Default(s) beyond the thirty (30) day period specified herein so long as the RECIPIENT is using reasonable

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efforts to cure and is making reasonable progress in curing such Event(s) of Default. The extension shall be in writing and appended to the Contract. If the RECIPIENT is unable or fails to timely cure an Event of Default, unless expressly waived in writing by the INSTITUTE, this Contract shall immediately terminate as of the close of business on the final day of the allotted cure period without any further notice or action by the INSTITUTE required. **In addition, and notwithstanding the foregoing, the INSTITUTE and the RECIPIENT agree that certain events that cannot be cured shall, unless expressly waived in writing by the INSTITUTE, constitute a final Event of Default under this Contract and this Contract shall terminate immediately upon the INSTITUTE giving the RECIPIENT written "Notice of Event of Default and FINAL TERMINATION."**

In the event that the INSTITUTE terminates the Contract under Section 8.01(c) above because allocated funds become legally unavailable during the Contract period, the INSTITUTE shall immediately provide written notification to the RECIPIENT of such fact pursuant to Section 9.21 "Notices." The Contract is terminated upon the RECIPIENT's receipt of that notification, subject to Section 9.09 "Survival of Terms."

Section 8.05 Duty to Report Event of Default. The RECIPIENT shall notify the INSTITUTE in writing pursuant to Section 9.21 "Notices", promptly and in no event more than (30) days after it obtains knowledge of the occurrence of any Event of Default. The RECIPIENT shall include a statement setting forth reasonable details of each Event of Default and the action which the RECIPIENT proposes to take with respect thereto,

Section 8.06 Obligations/Liabilities Affected by Early Termination. The RECIPIENT shall not incur new obligations that otherwise would have been paid for using Grant funds after the receipt of notice as provided by Section 3.04 "Notice Required", unless expressly permitted by the INSTITUTE in writing, and shall cancel as many outstanding obligations as possible. The INSTITUTE shall not owe any fee, penalty or other amount for exercising its right to terminate the Contract in accordance with Section 8.01. In no event shall the INSTITUTE be liable for any services performed, or costs or expenses incurred, after the Termination Date of the Contract. Early termination by either party shall not nullify obligations already incurred, including the RECIPIENT's revenue sharing obligations as set forth in Attachment D, or the performance or failure to perform obligations prior to the Termination Date.

Section 8.07 Interim Remedies. Upon receipt by the RECIPIENT of a notice of Event of Default, and at any time thereafter until such Event of Default is cured to the satisfaction of the INSTITUTE or this Contract is terminated, the INSTITUTE may enforce any or all of the following remedies (such rights and remedies being in addition to and not in lieu of any rights or remedies set forth herein):

(a) The INSTITUTE may refrain from disbursing any amount of the Grant funds not previously disbursed; provided, however, the INSTITUTE may make such a disbursement after the occurrence of an Event of Default without thereby waiving its rights and remedies hereunder;

(b) The INSTITUTE may enforce any additional remedies it has in law or equity.

The rights and remedies herein specified are cumulative and not exclusive of any rights or remedies that the INSTITUTE would otherwise possess.

Article IX
MISCELLANEOUS

Section 9.01 Uniform Grant Management Standards. Unless otherwise provided herein, the RECIPIENT agrees that the Uniform Grant Management Standards (UGMS), developed by the Governor's Budget and Planning Office as directed under the Uniform Grant Management Act of 1981, TEX. GOVT. CODE, Ch. 783, apply as additional terms and conditions of this Contract and that the standards are adopted by reference in their entirety, If there is a conflict between the provisions of this Contract and UGMS, the provisions of this Contract will prevail unless expressly stated otherwise.

Section 9.02 Management and Disposition of Equipment. During the term of this Contract, the RECIPIENT may use Grant funds to purchase Equipment to be used for the authorized purpose of the Project, subject to the conditions set forth below. Unless otherwise provided herein, title to Equipment shall vest in the RECIPIENT upon termination of the Contract.

(a) The INSTITUTE must authorize the acquisition in advance and in writing but an acquisition is deemed authorized if included in the Approved Budget for the Project;

(b) Equipment purchased with Grant funds must stay within the State of Texas;

(c) Equipment purchased with Grant funds must be materially deployed to the uses and purposes related to the Project;

(d) In the event the RECIPIENT is indemnified, reimbursed or otherwise compensated for any loss of, destruction of, or damage to the Equipment purchased using Grant funds, it shall use the proceeds to repair or replace said Equipment;

(e) Equipment may be exchanged (trade-in) or sold without the prior written approval of the INSTITUTE if the proceeds thereof shall he applied to the acquisition cost of replacement Equipment;

(f) The RECIPIENT may use its own property management standards and procedures provided that it observes the terms of UGMS, A-102, in all material respects;

(g) The title or ownership of the Equipment shall not be encumbered for purposes other than the Project nor or transferred other than to a permitted assignee of this Contract without the prior written approval of the INSTITUTE;

(h) If the original or replacement Equipment is no longer needed for the originally authorized purpose or for other activities supported by the INSTITUTE, the RECIPIENT shall request disposition instructions from the INSTITUTE and, upon receipt, shall fully comply therewith; and

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(i) If this Contract is terminated early pursuant to Section 8.01(b),(d), (e) or (f) above, the INSTITUTE shall determine the final disposition of Equipment purchased with Grant award money.

Section 9.03 Supplies and Other Expendable Property. The RECIPIENT shall classify as materials, supplies and other expendable property the allowable unit acquisition cost of such property under [***] necessary to carry out the Project. Title to supplies and other expendable property shall vest in the RECIPIENT upon acquisition.

Section 9.04 Acknowledgement of Grant Funding and Publicity. The parties agree to the following terms and conditions regarding acknowledging Grant funding and publicity:

(a) The parties agree to fully cooperate and coordinate with each other in connection with all press releases and publications regarding the award of the Grant, the execution of the Contract and the Institute-Funded Activities.

(b) The RECIPIENT shall notify the INSTITUTE's Information Specialist or similar personnel at least three business days prior to any press releases, advertising, publicity, use of CPRIT logo, or other promotional activities that pertain to the Project or any Institute-Funded Activity. In the event that the INSTITUTE wishes to participate in a joint press release, the RECIPIENT shall coordinate and cooperate with the INSTITUTE's Information Specialist or similar personnel to develop a mutually agreeable joint press release.

(c) Consistent with the goal of encouraging development of scientific breakthroughs and dissemination of knowledge, publication or presentation of scholarly materials is expected and encouraged. The RECIPIENT may publish in scholarly journals or other peer-reviewed journals (including graduate theses and dissertations) and may make presentations at scientific meetings without prior notice to or consent of the INSTITUTE, except as may otherwise be set forth in this Contract. The RECIPIENT shall promptly notify the INSTITUTE when any scholarly presentations or publications have been accepted for public disclosure and shall provide the INSTITUTE with final copies of all such accepted presentations and publications. The RECIPIENT shall acknowledge receipt of the INSTITUTE funding in all publications, presentations, press releases and other materials regarding the work associated with the Institute-Funded Activities. The RECIPIENT shall promptly submit an electronic version of all published manuscripts to PubMed Central in accordance with Section 9.05 "Public Access to Research Results."

(d) When grant funds are used to prepare print or visual materials for educational or promotional purposes for the general public (e.g., patients), and excluding presentations and publications discussed above in subsection (c), the RECIPIENT shall provide a copy of such materials to the INSTITUTE at least ten (10) days prior to printing. The RECIPIENT shall also acknowledge receipt of the INSTITUTE funding on all such materials including, but not limited to, brochures, pamphlets, booklets, training fliers, project websites, videos and

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DVDs, manuals and reports, as well as on the labels and cases for audiovisual or videotape/DVD presentations.

Section 9.05 Public Access to Results of Institute-Funded Activities. The RECIPIENT shall submit an electronic version of its final peer-reviewed journal manuscripts that arise from Grant funds to the digital archive National Library of Medicine's PubMed Central upon acceptance for publication. These papers must be accessible to the public on PubMed no later than 12 months after publication. This policy is subject to the terms of Attachment D and does not supplant applicable copyright law. For clarity, this policy is not intended to require the RECIPIENT to make a disclosure at a time or in any manner that would cause the RECIPIENT to abandon, waive or disclaim any intellectual property rights that it is obligated to protect pursuant to the terms of Attachment D.

Section 9.06 Work to be Conducted in State. The RECIPIENT agrees that it will use reasonable efforts to direct that any new or expanded preclinical testing, clinical trials, commercialization or manufacturing that is part of or relating to any Institute-Funded Activities take place in the State of Texas, including the establishment of facilities to meet this purpose. If the RECIPIENT decides not to conduct such work in the State of Texas, the RECIPIENT shall provide a prior written explanation to the INSTITUTE detailing the RECIPIENT's reasons for conducting the work outside of the State of Texas and the RECIPIENT's efforts made to conduct the work in the State of Texas

Section 9.07 Duty to Notify. During the term of this Contract and for a period of [***] thereafter, the RECIPIENT is under a continuing obligation to notify the INSTITUTE's executive director at the same time it is required to notify any Federal or State entity of any unexpected adverse event or condition that materially impacts the performance or general public perception of the conduct or results of the Project and the Institute-Funded Activities, including any impact to the Scope of Work included in the Contract and events or results that have a serious adverse impact on human health, safety or welfare. By way of example only, if clinical testing of the results of the Institute-Funded Activities reveal an unexpected risk of developing serious health conditions or death, then the RECIPIENT shall, at the same time it notifies any Federal or State entity, promptly so notify the INSTITUTE's executive director even if such results are not available until after the term of this Contract. Notice required under this section shall be made as promptly as reasonably possible and shall follow the procedures set forth in Section 9.21 "Notices."

Section 9.08 Severability. If any provision of this Contract is construed to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or enforceability shall not affect any other provisions hereof. The invalid, illegal or unenforceable provision shall be deemed stricken and deleted to the same extent and effect as if never incorporated herein. All other provisions shall continue as provided in this Contract.

Section 9.09 Survival of Terms. Termination or expiration of this Contract for any reason will not release either party from any liabilities or obligations set forth in this Contract that: (1) the Parties have expressly agreed shall survive any such termination or expiration; or (2) remain to be performed or by their nature would be intended to be applicable following any such termination or expiration. Such surviving terms include, but are not limited to,

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Section 9.10 Binding Effect and Assignment or Modification. This Contract and all terms, provisions and obligations set forth herein shall he binding upon and shall inure to the benefit of the parties and their successors and permitted assigns, including all other state agencies and any other agencies, departments, divisions, governmental entities, public corporations or other entities which shall be successors to either of the parties or which shall succeed to or become obligated to perform or become bound by any of the covenants, agreements or obligations hereunder of either of the parties hereto. Upon a permitted assignment of this Contract by RECIPIENT, all references to "the RECIPIENT" herein shall be deemed to refer to such permitted assignee.

Section 9.11 No Waiver of Contract Terms. Neither the failure by the RECIPIENT or the INSTITUTE, in any one or more instances, to insist upon the complete and total observance or performance of any term or provision hereof, nor the failure of the RECIPIENT or the INSTITUTE to exercise any right, privilege or remedy conferred hereunder or afforded by law, shall be construed as waiving any breach of such term or provision or the right to exercise such right, privilege or remedy thereafter. In addition, no delay on the part of either the RECIPIENT or the INSTITUTE, in exercising any right or remedy hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right or remedy preclude other or further exercise thereof or the exercise of any other right or remedy.

Section 9.12 No Waiver of Sovereign Immunity. No provision of this Contract is in any way intended to constitute a waiver by the INSTITUTE, the RECIPIENT (if applicable), or the State of Texas of any immunities from suit or from liability that the INSTITUTE, the RECIPIENT, or the State of Texas may have by operation of law.

Section 9.13 Force Majeure. Neither the INSTITUTE nor the RECIPIENT will be liable for any failure or delay in performing its obligations under the Contract if such failure or delay is due to any cause beyond the reasonable control of such party, including, but not limited to, unusually severe weather, strikes, natural disasters, fire, civil disturbance, epidemic, war, court order or acts of God. The existence of such causes of delay or failure will extend the period of performance in the exercise of reasonable diligence until after the causes of delay or failure have been removed. Each party must inform the other in accordance with Section 9.21 "Notices" within five (5) business days, or as soon as it is practical, of the existence of a force majeure event or otherwise waive this right as a defense.

Section 9.14 Disclaimer of Damages. IN NO EVENT WILL EITHER PARTY BE GABLE TO THE OTHER PARTY FOR ANY INDIRECT, SPECIAL, PUNITIVE, EXEMPLARY, INCIDENTAL OR CONSEQUENTIAL DAMAGES. THIS LIMITATION WILL APPLY REGARDLESS OF WHETHER OR NOT THE OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Section 9.15 Indemnification and Hold Harmless. Except as provided herein, the RECIPIENT agrees to fully indemnify and hold the INSTITUTE and the State of Texas harmless from and against any and all claims, demands, costs, expenses, liabilities, causes of action and

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damages of every kind and character (including reasonable attorneys fees) which may be asserted by any third party in any way related or incident to, arising out of, or in connection with (1) the RECIPIENT's negligent, intentional or wrongful performance or failure to perform under this Contract, (2) the RECIPIENT's receipt or use of Grant funds, or (3) any negligent, intentional or wrongful act or omission committed by the RECIPIENT as part of an Institute-Funded Activity or during the Project. In addition, the RECIPIENT agrees to fully indemnify and hold the INSTITUTE and the State of Texas harmless from and against any and all costs and expenses of every kind and character (including reasonable attorneys fees, costs of court and expert fees) that are incurred by the INSTITUTE or the State of Texas arising out of or related to a third party claim of the type specified in the preceding sentence. Notwithstanding the preceding, such indemnification shall not apply in the event of the sole or gross negligence of the INSTITUTE. If the RECIPIENT is a State of Texas agency or institution of higher education, then this Section 9.15 is subject to the extent authorized by the Texas Constitution and the laws of the State of Texas.

The RECIPIENT acknowledges and agrees that this indemnification shall apply to, but is not limited to, employment matters, taxes, personal injury, and negligence.

It is understood and agreed that it is not the intent of the parties to expand or increase the liability of the State of Texas under this Article. This provision is intended to prevent the RECIPIENT, the INSTITUTE and the State of Texas from attempting or appearing to assume liability it does not have the statutory or legal power to assume.

Section 9.16 Alternative Dispute Resolution. If applicable, the dispute resolution process provided for in TEX. GOVT. CODE, Ch. 2260 shall be used, as further described herein, to resolve any claim for breach of contract made against the INSTITUTE (excluding any uncured Event of Default). The submission, processing and resolution of a party's claim are governed by the published rules adopted by the Attorney General pursuant to TEX. GOVT. CODE, Ch. 2260, as currently effective, hereafter enacted or subsequently amended.

Section 9.17 Applicable Law and Venue. This Contract shall be construed and all disputes shall be considered in accordance with the laws of the State of Texas, without regard to its principles governing the conflict of laws. Provided that the RECIPIENT first complies with procedures set forth in Section 9.16 "Alternative Dispute Resolution," exclusive venue and jurisdiction for the resolution of claims arising from or related to this Contract shall be in the federal and state courts in Travis County, Texas.

Section 9.18 Attorneys' Fees. In the event of any litigation, appeal or other legal action to enforce any provision of the Contract, the RECIPIENT shall pay [***], if the INSTITUTE is the prevailing party. If the RECIPIENT is a State of Texas agency or institution of higher education, then this Section 9.18 is subject to the extent authorized by the Texas Constitution and the laws of the State of Texas.

Section 9.19 Counterparts. This Contract may be executed in any number of counterparts, each of which when so executed and delivered shall be an original, but such counterparts shall together constitute one and the same instrument.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Section 9.20 Construction of Terms. The headings used in this Contract are inserted only as a matter of convenience and for reference and shall not affect the construction or interpretation of this Contract, Where context so indicates, a word in the singular form shall include the plural, a word in the masculine form the feminine, and vice-versa. The word "including" and similar constructions (such as "includes", "included", "for example", "such as", and "e.g.") shall mean

"including, without limitation" throughout this Contract. The words "and" and "or" are not intended to convey exclusivity or nonexclusivity except where expressly indicated or where the context so indicates in order to give effect to the intent of the parties.

Section 9.21 Notices. All notices, requests, demands and other communications will be in writing and will be deemed given on the date received as demonstrated by (i) a courier's receipt or registered or certified mail return receipt signed by the party to whom such notice was sent, provided that such notice was sent to the address required by this Section, or (ii) a fax confirmation page showing that such fax was successfully transmitted to the fax number required by this Section. Notices shall be sent to the parties at the addresses or fax numbers specified below or as may be updated from time to time by the applicable party in a writing delivered to the other party pursuant to the terms of this Section.

If to the INSTITUTE to:

Cancer Prevention and Research Inst. of Texas
Grant Compliance
PO Box 12097
Austin, TX 78711

Phone: 512-463-3190
Fax: 512-475-2563

With a copy to:

Cancer Prevention and Research Inst. of Texas
General Counsel
PO Box 12097
Austin, TX 78711

Physical location for hand/overnight deliveries:
211 E. Seventh Street, Suite 300
Austin, Texas 78701

If to the RECIPIENT to:

[***]
(Individual to Receive Notice)
2150 Woodward, Suite 100
(Mailing Address)
Austin, TX 78744
(City, State, Zip)

Phone: (512) 681-5200

Physical location for hand/overnight deliveries
(if different):

With a copy to:
General Counsel
Mirna Therapeutics
21150 Woodward, Suite 100
Austin, Texas 78744

Fax: (512) 681-5201

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

EXECUTED IN DUPLICATE ORIGINALS ON THE DATES INDICATED.

RECIPIENT		**INSTITUTE**	
By	/s/ Paul Lammers	By	/s/ William Gimson
(Signature of Person Authorized to Sign Contracts)			
Name:	Dr. Paul Lammers	Name:	William "Bill" Gimson, Executive Director
Date:	08/31/2010	Date:	August 1, 2010

ATTACHMENT A

Project Description Summary

The overall goal of the project is to generate clinical data in support of the concept of microRNA Replacement Therapy in patients with advanced solid cancers, which would form the basis for the ultimate development of a new, innovative class of targeted and effective cancer therapies.

Project Co-Directors:
[***]
[***]
Mirna Therapeutics

Mirna Therapeutics

Project Goals and Timelines

Aim 1: [***]		
Milestone(s): [***]		
Estimated Budget:	**$**	**[***]**
Aim 2: [***]		
Milestone(s): [***]		

Estimated Budget:	**$**	**[***]**
· Aim 3: [***]		
Milestone(s): [***]		
Estimated Budget:	**$**	**[***]**
· Aim 4: [***]		
Milestone(s): [***]		
Estimated Budget:	**$**	**[***]**
· Aim 5: [***]		
Milestone(s): [***]		
Estimated Budget:	**$**	**[***]**

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Application ID: RP101219
Principal Investigator/Program Director: Ana Ward

ATTACHMENT B
Detailed Budget Form

BUDGET CATEGORY	Year 1	Year 2	Year 3	TOTAL
[***]	[***]	[***]	[***]	[***]
Grand TOTAL	[***]	[***]	[***]	$ 10,297,454.00

Texas/Federal Vendor ID#: 264824804
Fiscal Contact: Lynne Hohlfeld
Address: 2150 Woodward, Suite 100
Address 2: Austin, TX 78744
Phone: 512.681.5252
Fax: 512.681.5201
Email: ihohlfeld@mirnarx.com

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

ATTACHMENT C

ASSURANCES AND CERTIFICATIONS

This Attachment C is hereby incorporated into and made a part of that certain **CANCER RESEARCH GRANT CONTRACT** ("**Contract**") by and between the Cancer Prevention and Research Institute of Texas ("**CPRIT**" or the "**INSTITUTE**") and the RECIPIENT. A capitalized term used in this Attachment shall have the meaning given to term in the Contract or in the Attachments to the Contract, unless otherwise defined herein. In the event of a conflict between the provisions of this Attachment and the provisions of the Contract, this Attachment shall control. Notwithstanding any other provision of this Attachment C, each reference to "compliance" in the foregoing certifications and assurances shall mean "compliance in all material respects" and the RECIPIENT shall be deemed to be in compliance with a law, regulation or policy identified in a particular certification or assurance specified in this Attachment C if the RECIPIENT is in compliance in all materials respects with such law, regulation or policy, as applicable.

By signing this Contract, RECIPIENT certifies compliance with the following assurances and certifications required by the INSTITUTE (listed below). RECIPIENT further acknowledges that its obligations pursuant to the following assurances and certifications are ongoing.

Section C1.01 Demonstration of Matching Funds. Pursuant to TEX. HEALTH & SAFETY CODE § 102.255(d) and T.A.C. § 703.11, RECIPIENT has an amount of funds equal to [***] of the amount of the Grant to be disbursed each fiscal year of the Contract term dedicated to the same area of cancer research that is the subject of the Grant as demonstrated by the form incorporated herein to Attachment C. The RECIPIENT shall update the matching funds certification annually for each fiscal year that Grant funds are disbursed. The update must be on or before the anniversary of the Effective Date.

Section C1.02 Payment of Taxes. RECIPIENT's payment of franchise taxes is current or, if the RECIPIENT is exempt from payment of franchise taxes, that it is not subject to the State of Texas franchise tax. If franchise tax payments become delinquent during the Contract term, payments under this Contract may, upon delivery of written notice by the INSTITUTE to the RECIPIENT be withheld until the RECIPIENT's delinquent franchise tax is paid in full. The RECIPIENT also acknowledges that it is not otherwise exempt from state sales or occupancy tax as a result of this Contract.

Section C1.03 Compliance with Confidentiality Guidelines Relating to Personal and Medical Information. RECIPIENT complies with all applicable laws, rules and regulations relating to personal and medical information. Without in any way limiting the foregoing, RECIPIENT maintains and enforces, to the extent applicable to RECIPIENT, appropriate facility and information technology access rules and procedures to protect against inappropriate disclosure of patient records and all other documents containing patient personal and medical information deemed confidential by law, which are maintained in connection with the Project and Institute-Funded Activities, including provisions that comply with the requirements of the INSTITUTE's rules, 25 T.A.C. Section 703.14. Upon request from the INSTITUTE,

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

RECIPIENT will timely furnish a copy of the RECIPIENT's facility and information technology access rules and procedures, as well as any other applicable confidentiality guidelines.

If RECIPIENT, including any Collaborators or Contractors, works directly with patients or otherwise has access to or maintains patient personal and medical information, RECIPIENT specifically addresses Health Insurance Portability and Accountability Act of 1996 regulations concerning confidentiality of personal and medical information. Any disclosure of patient confidential information in any way related to the Project (including information that may be required by reports and inspections) must be in accordance with all applicable laws.

Section C1.04 Conduct of Research or Service Provided. RECIPIENT understands that the Project must be conducted with full consideration for the ethical and medical implications of the research performed or services delivered and comply with all applicable federal and state laws regarding the conduct of the research or service.

Section C1.05 Regulatory Certificates, licenses and Permits. All of the RECIPIENT's personnel, facilities and equipment involved or to be involved in the Project are certified, licensed, permitted, registered or approved by the appropriate regulating agency, where applicable. Any revocation, surrender, expiration, non-renewal, inactivation or suspension of any such certification, license, permit, registration or approval shall constitute grounds for Contract termination if the same is not remedied (or alternative personnel, facilities and/or equipment identified, as applicable, for use in the Project) within the applicable cure period specified in Section 8.04.

Section C1.06 Assurances and Certifications in Accordance with the NIH *Grants Policy Statement*:

(a) Civil Rights. Compliance with Title VI of the Civil Rights Act of 1964.

(b) Handicapped Individuals. Compliance with Section 504 of the Rehabilitation Act of 1973 as amended.

(c) Sex Discrimination. Compliance with Section 901 of Title IX of the Education Amendments of 1972 as amended.

(d) Age Discrimination. Compliance with the Age Discrimination Act of 1975, as amended.

(e) Patents, Licenses and Inventions. Compliance with the Standard Patent Rights clauses as specified in 37 CFR, Part 401 or 35 U.S.C. 203, if appropriate and applicable, in a manner that adequately protects the INSTITUTE'S rights in the Project Results.

(f) Human Subjects. Compliance with the requirements of federal policy concerning the safeguarding of the rights and welfare of human subjects who are involved in activities supported by federal funds. Before any funding may be utilized for any portion of the Project involving human subjects, RECIPIENT must receive approval from RECIPIENT's Institutional Review Board (IRB). Upon request, a copy of RECIPIENT's IRB approval must be provided to the INSTITUTE.

(g) Human Biological/Anatomical Material. Compliance with the recommendations of the NIH Office of Human Subject Research Medical Administrative Series (MAS) #M01-2 entitled "Procurement and Use of Human Biological Materials for Research," and any other applicable federal or state requirements pertaining; to the procurement and use of human biological material for research.

(h) Use of Animals. Compliance with applicable portions of the Animal Welfare Act (PL 89-544 as amended) and appropriate Public Health Service Policy on Humane Care and Use of Laboratory Animals regulations. Before any funding may be utilized for any portion of the Project involving animal subjects, RECIPIENT must receive approval from RECIPIENT's Institutional Animal Care and Use Committee (IACUC). Upon request, a copy of RECIPIENT's IACUC approval must be provided to the INSTITUTE.

(i) Debarment and Suspension. RECIPIENT certifies that neither it nor the Principal Investigator/Project Director or any other Recipient Personnel or personnel of any Collaborator or Contractor assigned to work on the Project are debarred, suspended, proposed for debarment, declared ineligible or otherwise excluded from participation in the Project by any federal or state department or agency.

(j) Non-Delinquency on Federal or State Debt. RECIPIENT certifies that neither it, nor, to its knowledge, any person to be paid from funds under this Contract, is delinquent in repaying any Federal debt as defined by OMB Circular A-129 or any debt to the State of Texas.

(k) Eligibility to Receive Payments on State Contracts. RECIPIENT certifies that it and, to its knowledge, the Principal Investigator/Project Director are not ineligible to receive the Grant award under this Contract pursuant to Tex. Fam. Code Ann. Section 231.006 and acknowledges that this Contract may be terminated and payment may be withheld if this certification is inaccurate.

(l) Drug-Free Workplace. Compliance with the Drug-Free Workplace Act of 1988 (45 CFR 82).

(m) Misconduct in Science. Compliance with 42 CFR Part 50, Subpart A, and Final Rule as published at 54 CFR 32446, August 8, 1989.

(n) Objectivity of Research/Conflict of Interest. Compliance with the NIH requirement to maintain a written standard of conduct and comply with 42 CFR Part 50, Subpart F, Responsibility of Applicants for Promoting Objectivity in Research. RECIPIENT must notify the INSTITUTE of any conflicting financial interests pertaining to the performance of the Project and assure that such conflict of interest has been appropriately managed, reduced or eliminated.

(o) Trafficking in Persons. Compliance with the NIH regulations on trafficking in persons as published at http://grants.nih.gov/grants/guidefnotice-files/NOT-OD-08-055.html.

(p) Criminal Misconduct. RECIPIENT shall promptly report to the INSTITUTE issues involving potential civil or criminal fraud related in any way to the Project, the Institute-Funded Activity or this Contract, such as false claims or misappropriation of federal or state funds.

ATTACHMENT C
CPRIT Matching Requirement Certification Form

Mirna Therapeutics, Inc.

FOR: **Entity/Institution Name**

	Award Year #1		Award Year #2		Award Year #3	
Research Category identified by CPRIT	**Total CPRIT Awards**	**Entity's/ Institution's Dedicated Funds**	**Total CPRIT Awards**	**Entity's/ Institution's Dedicated Funds**	**Total CPRIT Awards**	**Entity's/ Institution's Dedicated Funds**
[***]						
Total	[***]	[***]	[***]	[***]	[***]	[***]
Total non-state funds leveraged as a match for award.		[***]		$		$

The information above is the Institution's demonstration of available funds pursuant to its certification in Attachment C.

For questions regarding this form, please contact [***].

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

ATTACHMENT D

INTELLECTUAL PROPERTY AND REVENUE SHARING

This Attachment D is hereby incorporated into and made a part of that certain **CANCER RESEARCH GRANT CONTRACT** ("**Contract"**) by and between the Cancer Prevention and Research Institute of Texas ("**CPRIT**" or the "**INSTITUTE**") and the RECIPIENT. A capitalized term used in this Attachment shall have the meaning given the term in the Contract or in the Attachments to the Contract, unless otherwise defined herein. In the event of a conflict between the provisions of this Attachment and the provisions of the Contract, this Attachment shall control.

PART 1
OWNERSHIP AND INTELLECTUAL PROPERTY PROTECTION

Section D1.01 Ownership of Project Results. RECIPIENT and its Collaborators shall retain ownership of the Institute-Funded Technology and the Institute-Funded IPR, subject to the terms of the Contract.

Section D1.02 Transfer or Assignment of Rights to a Third Party. RECIPIENT shall notify the INSTITUTE of any proposed transfer or assignment of rights in any Institute-Funded IPR to a third party. RECIPIENT shall ensure that, in any assignment or transfer of Institute-Funded IPR, the transferee or assignee agrees in writing to (i) recognize that the Institute-Funded IPR is transferred or assigned subject to the licenses, interests and other rights in such Institute-Funded IPR provided to the INSTITUTE in the Contract and any applicable law or regulation, and (ii) take all actions necessary to protect all such licenses, interests and other rights.

Section D1.03 Protection of Institute-Funded IPR. Subject to Section D5.01 RECIPIENT shall use commercially reasonable efforts to appropriately protect the institute-Funded IPR, including without limitation, diligently seeking registration of patents and copyrights covering the Institute-Funded Technology, as appropriate. If RECIPIENT elects to abandon Institute-Funded IPR (including any partial abandonment of Institute-Funded IPR in specific territories), RECIPIENT shall provide the INSTITUTE with prior written notice of such election, with sufficient time (but no less than 30 days) for the INSTITUTE to exercise its rights in Section D5.01 in relation to the subject Institute-Funded IPR.

Section D1.04 **Cost of Protection**. The INSTITUTE shall not be responsible for, and no Grant funds may be used to pay for, any costs or expenses associated with [***].

Section D1.05 **Inventions**.

(a) **Disclosures**. RECIPIENT shall notify INSTITUTE of each Institute-Funded Invention by delivering a copy of the invention disclosure form (or similar document) within [***] after RECIPIENT receives the form from its Inventor. In the event that the invention disclosure form is revised or updated, RECIPIENT shall provide the INSTITUTE with the revised/updated invention disclosure form as part of the RECIPIENT's annual written report.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

(b) **Patent Prosecution and Maintenance**. For all Institute-Funded Inventions for which patent protection is pursued, RECIPIENT shall provide an annual written report to the INSTITUTE regarding the status of pending applications and issued patents .

Section D1.06 **Required Agreements with Recipient Personnel and Contractors**. The RECIPIENT shall have, maintain and enforce written policies or agreements applicable to Recipient Personnel and Contractors with terms sufficient to enable RECIPIENT to fully comply with all terms and conditions of this Contract. RECIPIENT shall promptly report to INSTITUTE any material breach of such policies or agreements relating to or affecting any of the material provisions of this Contract.

Section D1.07 **Agreements with Collaborators**. All agreements between RECIPIENT and a Collaborator relating to or affecting joint ownership of any Project Result shall recognize the licenses, interests and other rights provided to the INSTITUTE in the Contract. RECIPIENT shall provide to the INSTITUTE a copy of each such agreement affecting joint ownership of any Project Result.

PART 2
NON-COMMERCIAL LICENSES

Section D2.01 **RECIPIENT License**. In granting an Exclusive License to any Project Result, RECIPIENT shall retain the right to Exploit all Project Results (including material embodiments thereof) for education, research and other non-commercial purposes, and the right to grant the licenses pursuant to Section D2.02 below.

Section D2.02 **INSTITUTE License**. RECIPIENT agrees to grant, and does hereby grant, to the INSTITUTE a non-exclusive, irrevocable, royalty-free, perpetual, worldwide license under the Institute-Funded IPR to Exploit all Project Results (including material embodiments thereof) for or on behalf of the INSTITUTE and other governmental entities and agencies of the State of Texas for education, research and other non-commercial purposes only. RECIPIENT shall make the Institute-Funded Technology available by reasonable means to the INSTITUTE in order for the INSTITUTE to exercise its rights under this Section. The INSTITUTE may not transfer or sublicense the licenses granted under this Section, except to the State of Texas or other Texas agency.

Section D2.03 **No Implied Licenses**. No implied licenses are granted under this Agreement including any license to any Intellectual Property Rights owned or controlled by RECIPIENT outside of the Institute-Funded IPR. Nothing in this Agreement shall be construed to impose an obligation on RECIPIENT to license or otherwise make available any of its Intellectual Property Rights or other resources owned or controlled by it except as expressly provided in this Agreement with respect any Institute Funded IPR.

PART 3
COMMERCIALIZATION OF PROJECT RESULTS

Section D3.01 **Commercialization Strategy**. RECIPIENT shall be under a continuing obligation throughout the term of this Contract to enhance and improve the commercial development plan submitted with the Application and to provide an annual written report to the

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INSTITUTE regarding the RECIPIENT's efforts to commercialize or otherwise bring to practical application Project Results. The INSTITUTE may, at its option and at any time, provide RECIPIENT with comments regarding the RECIPIENT's commercial development plan and strategy, in which case RECIPIENT shall consider in good faith and use reasonable efforts to account for and incorporate the INSTITUTE's input into such commercial development plan and strategy.

Section D3.02 **Commercialization Efforts**. The RECIPIENT shall, whether through its own efforts or the efforts of a licensee under a License Agreement allowed by the terms of this Attachment, use diligent and commercially reasonable efforts to commercialize or otherwise bring to practical application the Project Results in accordance with the commercial development plan described in Section D3.01.

Section D3.03 **Licensing of Project Results**. Each License Agreement entered into by the RECIPIENT shall include an acknowledgement by the licensee that (i) such License Agreement is subject to the INSTITUTE's licenses, interests and other rights under this Contract, and (ii) to the extent that there is a conflict between the terms of the License Agreement and the terms of this Contract, the terms of this Contract shall prevail. In addition, all License Agreements shall include terms obligating the licensee to report to the RECIPIENT such information as is required for the RECIPIENT to fully comply with the terms of the Contract, including without limitation the reporting obligations set forth in Attachment E, and to allow RECIPIENT to make the grants specified in Sections D2.02. The RECIPIENT shall monitor the performance of its licensees and such licensees' compliance with the terms of the License Agreements and shall take commercially reasonable actions to enforce the terms of all License Agreements. The RECIPIENT shall promptly report to the INSTITUTE any material breach of a License Agreement relating to or affecting any of the material provisions of this Contract.

Section D3.04 **Cost of [***]**. The INSTITUTE shall not be responsible for, and no Grant funds may be used to pay for, any costs or expenses associated with the RECIPIENT's [***].

Section D3.05 **Survival**. The licenses, rights and obligations set forth in this Attachment D shall survive any termination of this Contract, including any termination for convenience by RECIPIENT, except in the event that RECIPIENT pays the Buyout Amount as set forth in Part 4, in which case the licenses, rights and obligations set forth in this Attachment D shall automatically terminate..

Section D3.06 Recipient Opt-Out. RECIPIENT may, after diligently attempting to comply with the terms of Section D3.02, notify the INSTITUTE in writing that it is electing to cease its efforts, either directly or through a licensee, to commercialize or otherwise bring to practical application any particular Project Results. Such written notice must identify the applicable Project Results, provide a reasonable explanation of the reasons for RECIPIENT's election, including any feasibility studies, trial results, regulatory impediments, financial analyses or similar assessments, and must identify any deadlines in relation to the applicable Project. Results that then exist. Upon receipt of such notice, the INSTITUTE shall have the option, but not the obligation, to exercise its rights in Section 5.01 in relation to the subject Project Results at the INSTITUTE's expense. The INSTITUTE shall notify the RECIPIENT in writing within thirty (30) days of its receipt of the RECIPIENT's notice if the INSTITUTE elects to exercise its

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rights in relation to the subject Project Results. In the event that the INSTITUTE exercises its option under this section, the RECIPIENT shall fully cooperate with the INSTITUTE's efforts, in commercializing or otherwise bringing to practical application the applicable Project Results.

PART 4
REVENUE SHARING

Section D4.01 Revenue Sharing; Buyout.

(a) RECIPIENT shall pay to INSTITUTE royalties as follows:

(i) [***] until the aggregate amount of royalties paid to INSTITUTE pursuant to this Section D4.01(a)(i) equals [***] of Net Grant Award Proceeds; and

(ii) [***] thereafter.

(b) Notwithstanding the foregoing, if Net Grant Award Proceeds are less than $10,297,454, the percentages set forth in clauses (i) and (ii) of this Section D4.01(a) shall be reduced. The amount of the reduction will be calculated by multiplying the percentages in clauses (i) and (ii) by a fraction, (x) the numerator of which is the Net Grant Award Proceeds, and (y) the denominator of which is $10,297,454.

(c) Notwithstanding anything to the contrary in this Section D4.01, upon RECIPIENT's written notice of the Buyout Notice Trigger Event to INSTITUTE at any time after the Termination Date (the "**Buyout Notice**"), RECIPIENT may, in lieu of paying any additional royalties to INSTITUTE pursuant to Section D4.01(a), pay to INSTITUTE the dollar amount set forth in the following table opposite the applicable period in which such Buyout Notice is delivered (the applicable dollar amount being referred to as the "**Buyout Amount**"):

Period in Which Buyout Notice is Delivered	Buyout Amount
[***]	[***]

After satisfaction of its obligations under this Section D4.01(b), RECIPIENT shall have no further obligation under this Section D4.01.

(d) "**Net Grant Award Proceeds**" means the aggregate amount of Grant award proceeds advanced to RECIPIENT, net of any Grant award proceeds repaid by RECIPIENT to INSTITUTE, including, without limitation, pursuant to Section 4.07 of the Contract.

Section D4.02 Adjustments. If any funding sources other than the INSTITUTE (but excluding RECIPIENT) contribute funds, directly or indirectly, to the research yielding any particular Project Result(s) and such funding sources are legally or contractually entitled to receive royalty based compensation with respect to such Project Result(s) (hereinafter a "**Participating Funding Source**"), then the royalty percentages in Section D4.01(a) in effect at any time shall be reduced [***]. For the sake of clarity, Participating Funding Sources do not include [***]. In calculating such reduced rate, funds from [***] shall not be included. In addition, for clarity, the rate shall not be reduced as a result of any funds received from funding sources where such funding sources are not [***].

Section D4.03 Statements and Timing of Payments. All payments owed pursuant to this Part 4 shall be made to the Cancer Prevention and Research Institute of Texas, and are payable on or before the [***] following the end of the calendar quarter in which RECIPIENT receives the Revenue or, in the case of Section D4.04, receives the monetary recovery. For each payment specified in Section D4.01, the payment shall be accompanied by a statement specifying: (i) the Grant to which the payment relates, (ii) the identities of and amounts funded by all Participating Funding Sources, (iii) the License Agreements to which the payment relates, (iv) the quantity of all Sales of each Commercial Product and Commercial Service since the last payment, if Sales are applicable to the current payment, (v) the gross consideration from all such License Agreements and Sales, if Sales are applicable to the current payment, and (vi) the amount of the payment to the Cancer Prevention and Research Institute of Texas.

Section D4.04 Recoveries in Enforcement Actions. In the event that RECIPIENT receives any monetary recovery from its enforcement of Institute-Funded IPR against infringement by a third party, then it shall pay to the State of Texas a share of such monetary recovery, including [***], less the [***], at the same rate and in the same manner as it shares Revenue pursuant to Section D4.01 (including any adjustments allowed by Section D4.02). For clarity, if the enforcement action is resolved by way of the execution of a License Agreement with the infringing third party, such License Agreement is consistent with the Section D4.01, then this Section D4.04 is not intended to apply to such License Agreement or the consideration specified therein.

Section D4.05 Revenue-Related Records. In addition to satisfying the requirements of Article IV of the Contract and Section E1.03 of Attachment E, the RECIPIENT shall keep complete and accurate Revenue-related Records until the [***] of the date of the payment of the last royalty payment owed hereunder, in sufficient detail to permit the INSTITUTE to confirm the accuracy of the statements delivered to the INSTITUTE under Section D4.03 and the calculation of the royalties owed hereunder.

Section D4.06 Audit of Revenue-Related Records. Upon at least [***] advance written notice, the RECIPIENT shall permit the INSTITUTE or its representatives or agents, at the INSTITUTE'S expense, to examine the Revenue-related Records of the RECIPIENT pursuant to Section D4.05 at least once per calendar year during regular business hours for the purpose of and to the extent necessary to verify the RECIPIENT's compliance with this Part 4. The rights of the INSTITUTE under this Section D4.06 shall terminate on the [***] of the date of the payment of the last royalty payment owed hereunder. In the event that any such examination reveals an underpayment to the INSTITUTE of greater than [***] of the amounts previously paid

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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by the RECIPIENT to the INSTITUTE, then the RECIPIENT shall reimburse the INSTITUTE for the cost of such examination.

PART 5
OPT-OUT AND DEFAULT

Section D5.01 RECIPIENT Opt-Out. Upon receipt of RECIPIENT's notice of its election (i) under Section D1.03 to abandon any Institute-Funded IPR or (ii) under Section 3.06 to cease its efforts to commercialize or otherwise bring to practical application any particular Project Results, the INSTITUTE shall have the option, but not the obligation, to pursue protection of the applicable Institute-Funded IPR, including directing the filing, prosecution and maintenance of patents covering the applicable Institute-Funded Inventions and/or to commercialize or otherwise bring to practical application the applicable Project Results, at its own cost, either directly or through one or more licensees. If the INSTITUTE elects to exercise such option, it shall notify RECIPIENT in writing within [***] of its receipt of RECIPIENT's notice and RECIPIENT shall thereafter comply with the terms of Section D5.03.

Section D5.02 RECIPIENT Default. In the event that the INSTITUTE notifies RECIPIENT in writing of RECIPIENT's failure to materially comply with its obligations under Sections D1.03 or D3.02 with respect to any particular Project Results, and RECIPIENT fails to cure such failure within [***] of such notice, then the INSTITUTE shall have the option, but not the obligation, to direct the filing, prosecution and maintenance of patents covering the applicable Institute-Funded Inventions and/or to [***], at its own cost, either directly or through one or more licensees. If the INSTITUTE elects to exercise such option, it shall notify the RECIPIENT in writing of such election and RECIPIENT shall thereafter comply with the terms of Section D5.03.

Section D5.03 RECIPIENT Cooperation upon Opt-Out or Default. In the event that the INSTITUTE exercises its option under Section D5.01 or D5.02, the RECIPIENT shall:

(1) [***] to the INSTITUTE or the INSTITUTE'S designee, to the maximum extent allowed by law, including where relevant and necessary to facilitate the foregoing transfer, requesting and diligently attempting to obtain any approvals required by law or otherwise in relation to such transfer;
(2) to the extent that RECIPIENT is unable to [***] to the INSTITUTE as specified in item (1), and subject to any existing third party rights, RECIPIENT [***], provided that the INSTITUTE may [***] only after exercising its option under Section D5.01 or D5.02;
(3) fully cooperate with the INSTITUTE's efforts, and at the INSTITUTE's cost, in [***], including [***] for such purposes and executing any documents and taking any further action necessary to fully effectuate the intent of this Section; and
(4) not take any action that would materially impede the INSTITUTE's ability to protect the applicable Institute-Funded Inventions.

If the INSTITUTE exercises its option under Sections D5.01 or D5.02, RECIPIENT shall have [***] (except as set forth in Part 2 of this Attachment, if applicable) and shall not be entitled to [***], except to the minimum extent required by law, if any. To the extent that the INSTITUTE has exercised its option under Section D5.01 or D5.02 and RECIPIENT is unable to [***] to the

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

INSTITUTE as specified in item (1), then the INSTITUTE's [***] set forth in item (2) includes [***]. Subject to the statutory duties of the Texas Attorney General, if any, RECIPIENT shall cooperate fully with the INSTITUTE in any action brought by the INSTITUTE to enforce the Intellectual Property Rights in [***], at the INSTITUTE's cost, including without limitation, joining the enforcement action in name as a party plaintiff after all required approvals are obtained; provided that the INSTITUTE or its designee shall have full control over such enforcement action and shall receive and retain all monetary recoveries resulting from such enforcement actions, including any punitive damages.

PART 6
DEFINITIONS

The following terms shall have the following meaning throughout this Attachment. Other terms may be defined elsewhere in this Attachment.

(1) **Authorized Seller** — RECIPIENT, its Collaborators, or their licensees or any other party authorized by RECIPIENT, its Collaborators or their licensees to make a Sale on their behalf.

(2) **Buyout Trigger Event** — the [***] and the Party notifies the RECIPIENT it desires to buy out the Royalty defined by this Contract.

(3) **Commercial Product** — anything that incorporates, is based on, utilizes or is developed from Project Results and is created by human or mechanical effort or by a natural process and that is capable of being sold, licensed, transferred or conveyed to another party or is capable of otherwise being Exploited or disposed of, whether in exchange for consideration or not, including without limitation any drug, chemical or biological compound, gene, nucleic acid or nucleic acid sequence, gene therapy, plant, machine, mechanical device, hardware, tool or computer program.

(4) **Commercial Service** — any service performed that incorporates, is based on, utilizes or is developed from Project Results. For clarity, Commercial Service does not include research and development performed by RECIPIENT or its Collaborators.

(5) **Exclusive License** — a License Agreement under which the specific rights granted to the licensee with respect to [***], including without limitation scope of use and territorial rights, are granted on an exclusive basis.

(6) **Exploit** — make, have made, use, sell, offer to sell, import, export or otherwise dispose of, practice, copy, distribute, create derivative works of, publicly perform or publicly display.

(7) **Institute-Funded IPR** — any and all Intellectual Property Rights in and to Institute-Funded Technology. In no event shall Institute-Funded IPR include any intellectual property rights and/or technology in existence and owned/controlled by the RECIPIENT prior to the receipt of funds from the INSTITUTE, the listing of such IPR and/or technology in existence and owned/controlled by the RECIPIENT prior to the receipt of funds from the INSTITUTE is attached herein.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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(8) **Institute-Funded Invention** — an Invention conceived or first reduced to practice by RECIPIENT, Recipient Personnel and/or Collaborator(s) in the performance of Institute-Funded Activity.

(9) **Institute-Funded Technology** — any and all of the following resulting or arising from Institute-Funded Activity during the Contract term: (a) proprietary and confidential information, including but not limited to data, trade secrets and know-how; (b) databases, compilations and collections of data; (c) tools, methods and processes; and (d) works of authorship, excluding all scholarly works, but including, without limitation, computer programs, source code and executable code, whether embodied in software, firmware or otherwise, documentation, files, records, data and mask works; and all instantiations of the foregoing in any form and embodied in any form, including but not limited to therapeutics, drugs, drug delivery systems, drug formulations, devices, diagnostics, biomarkers, reagents and research tools. Institute-Funded Technology includes Institute-Funded Inventions. In no event shall Institute-Funded Technology include items that were conceived of, in existence, or owned/controlled by RECIPIENT prior to receipt of funds from the INSTITUTE (a) proprietary and confidential information, including but not limited to data, trade secrets and know-how; (b) databases, compilations and collections of data; (c) tools, methods and processes; and (d) works of authorship, excluding all scholarly works, but including, without limitation, computer programs, source code and executable code, whether embodied in software, firmware or otherwise, documentation, files, records, data and mask works; and all instantiations of the foregoing in any form and embodied in any form, including but not limited to therapeutics, drugs, drug delivery systems, drug formulations, devices, diagnostics, biomarkers, reagents and research tools.

(10) **Intellectual Property Rights** — any and all of the following and all rights in, arising out of, or associated therewith: (a) all United States and foreign patents and utility models and applications therefor, and all reissues, divisions, renewals, extensions, provisionals, and continuations and continuations-in part thereof, and equivalent or similar rights anywhere in the world in inventions and discoveries; (b) all trade secrets and rights in know-how and proprietary information; (c) all copyrights, copyright registrations and applications therefor, and all other rights corresponding thereto throughout the world; (d) all mask works, mask work registrations and applications therefor, and any equivalent or similar rights in semiconductor masks, layouts, architectures or topology; and (e) any similar, corresponding or equivalent rights to any of the foregoing anywhere in the world.

(11) **Invention** — a method, device, process or discovery that is conceived and/or reduced to practice, whether patentable or not.

(12) **License Agreement** — an agreement by which an owner of a Project Result grants any right to Exploit such Project Result to another party in exchange for consideration.

(13) **Licensing Activities** — the efforts of RECIPIENT or its Collaborator to negotiate, execute or enforce a License Agreement.

(14) **Necessary Additional IPR** — any [***] Intellectual Property Rights (a) [***], and (b) [***] set forth in the applicable Section of this Attachment D.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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(15) **Non-Exclusive License** — a License Agreement under which the rights granted to the licensee with respect to the Project Results are granted on a non-exclusive basis.

(16) **Project Results** — any and all Institute-Funded Technology and Institute-Funded IPR.

(17) **Revenue** — the [***] consideration, whether [***], received from Sales and License Agreements related to Project Results (including without limitation, any [***]), net of (a) trade or quantity discounts or rebates, credits, allowances or refunds given for rejected or returned Commercial Products or Commercial Services, (b) any sales, value-added or other tax or governmental charge levied on the sale, transportation or delivery of a Commercial Product or Commercial Service (but excluding any income tax owed by the RECIPIENT), and (c) any separately stated charges for freight, postage, shipping and insurance.

(18) **Sale** — means any sale, lease, transfer, conveyance or other exploitation or disposition of a Commercial Product or Commercial Service for which consideration is received by an Authorized Seller.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

ATTACHMENT E

REPORTING REQUIREMENTS

This Attachment E is hereby incorporated into and made a part of that certain **CANCER RESEARCH GRANT CONTRACT** ("**Contract**") by and between the Cancer Prevention and Research Institute of Texas ("**CPRIT**" or the "**INSTITUTE**") and the RECIPIENT. A capitalized term used in this Attachment shall have the meaning given to term in the Contract or in the Attachments to the Contract, unless otherwise defined herein, In the event of a conflict between the provisions of this Attachment and the provisions of the Contract, this Attachment shall control.

INSTITUTE and RECIPIENT agree as follows:

ANNUAL REPORTING

Section E1.01 Annual Reports. The RECIPIENT shall submit reports annually to the INSTITUTE within [***] of the anniversary of the Effective Date of this Contract or at such other time as may be specified herein. The reports shall be submitted by the means and in the form(s) required by the INSTITUTE and shall be signed by the Principal Investigator/Program Director and the RECIPIENT's Authorized Signing Official. To the extent possible, the reports shall only include information that may be shared publicly. However, if it is necessary to submit information in the reports that the RECIPIENT considers confidential in order to fully comply with the terms of this Contract, then the RECIPIENT shall use reasonable efforts to mark such information as "confidential" and shall, to the extent practicable, to segregate such information within the reports to facilitate its redaction should redaction ever be necessary or appropriate.

Section E1.02 Contents of Reports. Each report shall contain a signed verification (electronic signature is acceptable) of RECIPIENT's compliance with each of its obligations as set forth in the Contract and shall include the following for the period covered by such report, as may then be applicable:

(a) **Project Data**. During the term of the Contract, RECIPIENT shall include in its annual report each of the following (except that the final annual report due under this part (a) shall be due within [***] after the end of the term of the Contract):

(1) A brief statement of the progress made to under the Scope of Work, including the progress to achieve the Project Goals and Timelines set forth in Attachment A.
(2) A brief statement of the Project Goals for the twelve months following submission of the report.
(3) New jobs created in the preceding twelve month period as a result of the Grant funds awarded to RECIPIENT.
(4) An inventory of the Equipment purchased for the Project using Grant funds.
(5) A HUB report in accordance with Section 3.08 "Historically Underutilized Businesses" of the Contract,

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

(b) **Commercialization Data**. During the term of the Contract and continuing thereafter for so long as RECIPIENT has ongoing obligations to the INSTITUTE with respect to protection, development, commercialization and licensing of Project Results pursuant to Attachment D, RECIPIENT shall provide information about commercialization activities in a format specified by the INSTITUTE.

(c) **Revenue Sharing Data**. During the term of the Contract and continuing thereafter for so long as RECIPIENT has ongoing obligations to the INSTITUTE with respect to revenue sharing pursuant to Attachment D:

(1) A statement of the identities of the funding sources, amounts and dates of funding for all funding sources for the Project.
(2) A brief statement of the RECIPIENT's efforts to secure additional funds to support the Project.
(3) All financial information necessary to verify the calculation of the revenue sharing amounts specified in Attachment D.

(d) **Additional Data**. In addition to the foregoing, RECIPIENT shall use commercially reasonable efforts to also promptly report any other information required by this Contract or otherwise reasonably requested by the INSTITUTE, the Legislature, or any other funding or regulatory bodies covering the RECIPIENT's activities under this Contract.

Section E1.03 Record Keeping and Audits. The provisions of Article IV of the Contract shall apply fully to all information reported to the INSTITUTE pursuant to this Attachment, except that the right of the State of Texas to audit and the RECIPIENT's obligation to maintain Records shall continue until four years after the date of each such report made by RECIPIENT hereunder.

Section E1.04 Confidentiality of Documents and Information. The provisions of Section 2.13 "Confidentiality of Documents and Information" of the Contract shall apply fully to all Confidential Information reported, delivered or submitted to the INSTITUTE pursuant to this Attachment E.

ATTACHMENT F-1

This Attachment F-1 is hereby incorporated into and made a part of that certain **CANCER RESEARCH GRANT CONTRACT** ("**Contract**") by and between the Cancer Prevention and Research Institute of Texas ("**CPRIT**" or the "**INSTITUTE**") and the RECIPIENT. A capitalized term used in this Attachment shall have the meaning given to term in the Contract or in the Attachments to the Contract, unless otherwise defined herein. In the event of a conflict between the provisions of this Attachment and the provisions of the Contract, this Attachment shall control.

INSTITUTE and RECIPIENT agree to the following change:

Section 2.09 Transfer or Assignment by Recipient is revised in the following manner: The entire text following the title is deleted and replaced with the following:

"This Contract is not transferable or otherwise assignable by the RECIPIENT, whether by operation of law or otherwise, without the prior written consent of the INSTITUTE. Any such attempted transfer or assignment without the prior written consent of the INSTITUTE shall be null, void and of no effect. If the Principal

Investigator/Program Director leaves the employment of RECIPIENT for any reason during the course of the Grant, prior written approval by the INSTITUTE is required for the replacement of the Principal Investigator/Program Director. Under no circumstance shall the Grant be transferred or assigned to an organization outside of the State of Texas."

Section 4.07 Repayment of Grant Proceeds for Relocation Outside of Texas is revised by adding the following sentence to the end of Section 4.07:

"In the event that RECIPIENT is [***] outside of the State, 4.07 shall not be automatically triggered if [***]."

The RECIPIENT and the INSTITUTE agree and understand that prior to an event that may trigger Section 4.07, the RECIPIENT and the INSTITUTE will negotiate in good faith considering the circumstances as presented at that time regarding whether or not [***]. In the event that RECIPIENT is [***], the INSTITUTE will look to whether [***].

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

EXECUTED IN DUPLICATE ORIGINALS ON THE DATES INDICATED.

RECIPIENT		**INSTITUTE**	
By	/s/ Paul Lammers	By	/s/ William Gimson
(Signature of Person Authorized to Sign Contracts)			
Name:	Dr. Paul Lammers	Name:	William "Bill" Gimson, Executive Director
Date:	08/31/2010	Date:	August 30, 2010

Exhibit 10.7

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Supply Agreement for a Liposomal Formulation

November 2012

between

Mirna Therapeutics, Inc., a corporation duly registered under the laws of the State of Delaware, USA, having its principal place of business at 2150 Woodward St., Suite 100, Austin, TX 78744, USA, and duly licensed to do business there

- hereinafter called MIRNA -

and

Polymun Scientific Immunbiologische Forschung GmbH, a corporation duly incorporated under the laws of the Federal Republic of Austria having its principal place of business at Donaustr. 99, A-3400 Klosterneuburg, Austria, and duly licensed to do business there

- hereinafter called POLYMUN -

MIRNA and POLYMUN also herein referred to individually as PARTY or collectively as PARTIES.

PREAMBLE

1. POLYMUN is owner and authorized to dispose of the POLYMUN LIPOSOME TECHNOLOGY.

2. Furthermore, POLYMUN has POLYMUN KNOW-HOW.

3. MIRNA owns or otherwise controls the INGREDIENT.

4. The PARTIES intend to apply the POLYMUN LIPOSOME TECHNOLOGY and the POLYMUN KNOW-HOW for the efficient production of the PRODUCT and to co-operate for that purpose (the “PROJECT”).

§ 1. DEFINITIONS

1. **AFFILIATE** shall mean any corporation or business entity, which directly or indirectly (i) CONTROLS a PARTY, (ii) is CONTROLLED by a PARTY or (iii) is under common control with a PARTY (the terms “CONTROLS” and “CONTROLLED” meaning (i) ownership of more than fifty percent of the voting rights and equity of such corporation or business entity and/or (ii) the power to direct the management of such corporation or business entity).

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2. **AGREEMENT** shall mean the body of this AGREEMENT for the development, manufacturing, and supply of the PRODUCT, signed by both PARTIES including all annexes and amendments thereto.

3. **APPLICABLE LAWS** shall mean all laws, statutes, ordinances, codes, rules and regulations that have been enacted by a GOVERNMENT AUTHORITY and are in force as of the EFFECTIVE DATE or come into force during the term of this AGREEMENT, in each case to the extent that the same are applicable to the performance by the PARTIES of their respective obligations under this AGREEMENT or otherwise to the subject matter of this AGREEMENT. For purposes of this AGREEMENT, cGMP shall be deemed to be included within the term APPLICABLE LAWS.

4. **BACKGROUND RIGHTS OF MIRNA** shall mean all know-how and proprietary rights of MIRNA existing on the EFFECTIVE DATE or arising during the term of this AGREEMENT from the separate and independent efforts of MIRNA.

5. **BACKGROUND RIGHTS OF POLYMUN** shall mean all know-how and proprietary rights of POLYMUN existing on the EFFECTIVE DATE hereof or arising during the term of this AGREEMENT from the separate and independent efforts of POLYMUN.

6. **cGMP** shall mean those current good manufacturing practices applicable in the United States (under the regulations set forth in 21 C.F.R. Subchapter C and the requirements imposed thereunder by the United States Food and Drug Administration) for clinical supply in effect from time to time during the term of this AGREEMENT, together with equivalent regulations and requirements in the European Union and other Governmental Authorities designated in the SOW.

7. **EFFECTIVE DATE** shall mean the date of the last signature necessary to render this AGREEMENT valid.

8. **FCA** shall mean FCA (Free Carrier) as defined by INCOTERMS 2010.

9. **GOVERNMENTAL AUTHORITY** means any supranational, national, regional, state or local government, court, governmental agency, authority, board, bureau, instrumentality or regulatory body.

10. **INFORMATION** shall mean any data, information, know-how, results etc. related to this AGREEMENT.

11. **INGREDIENT** shall mean the mimic of mir-34A as described in the SOW.

12. **MATERIALS** shall mean materials, documentation, substances, equipment, including but not limited to the INGREDIENTS, delivered to POLYMUN by MIRNA, and [***].

13. **PLT RESULTING PROPRIETARY RIGHTS** shall mean all proprietary rights [***].

14. **POLYMUN KNOW-HOW** shall mean POLYMUN's technical and operational experience, knowledge, as well as other information and know-how in the field of [***].

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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15. **POLYMUN LIPOSOME TECHNOLOGY** shall mean POLYMUN's patents and patent applications listed in Annex 1 of this AGREEMENT.

16. **PRODUCT** shall mean the liposomal formulation of the INGREDIENT with the NOV340 formula of the Smarticle® technology owned by Marina Biotech, Inc. that MIRNA intends to use, as described in the SOW.

17. **PRODUCT RESULTING PROPRIETARY RIGHTS** shall mean all proprietary rights arising from [***] activities of POLYMUN and/or its agents and subcontractors, solely by POLYMUN, or jointly or severally with the assistance of MIRNA, [***]. For further clarity, it is understood that the PRODUCT RESULTING PROPRIETARY RIGHTS shall include [***].

18. **PRODUCT SPECIFICATIONS** shall mean the specifications for the PRODUCT contained in Exhibit 1 to the SOW set forth in Annex 2 (as the same may be amended from time to time by the mutual agreement of the PARTIES) together with applicable manufacturing protocols set forth in Annex 2 (as the same may be amended from time to time by the mutual agreement of the PARTIES) and cGMP.

19. **QUALITY AGREEMENT** shall mean the QUALITY AGREEMENT signed by the PARTIES during the term of this AGREEMENT.

20. **STATEMENT OF WORK OR SOW** shall mean the detailed description of how the PROJECT will be performed as set forth in Annex 2.

21. **SUBJECT MATTER OF AGREEMENT** shall mean (a) the development of a suitable production process for the PRODUCT by POLYMUN under application and utilization of the POLYMUN LIPOSOME TECHNOLOGY and the POLYMUN KNOW-HOW for preclinical and clinical application and (b) the manufacture and supply of the PRODUCT as set forth in the SOW. For this purpose, MIRNA will make available the INGREDIENT including all relevant physical and chemical properties.

22. **WORK PRODUCT** shall mean all work in progress and the results of the development and/or manufacturing activities pursuant to this AGREEMENT, including but not limited to POLYMUN reports prepared for MIRNA.

§ 2. PROPRIETARY RIGHTS

1. BACKGROUND RIGHTS OF MIRNA shall be the sole and exclusive property of MIRNA. POLYMUN shall have no right or license to use any such BACKGROUND RIGHTS OF MIRNA except as may be necessary to manufacture the PRODUCT pursuant to this AGREEMENT.

2. BACKGROUND RIGHTS OF POLYMUN shall be the sole and exclusive property of POLYMUN. MIRNA shall have no right or license to use any such BACKGROUND RIGHTS OF POLYMUN except as may be necessary for performing hereunder. Notwithstanding the foregoing, POLYMUN and MIRNA may negotiate in good faith license terms for BACKGROUND RIGHTS OF POLYMUN at any further point in time.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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3. Regardless of which PARTY generated PRODUCT RESULTING PROPRIETARY RIGHTS, all rights in PRODUCT RESULTING PROPRIETARY RIGHTS shall be the sole and exclusive property of MIRNA. MIRNA shall have the right to prepare, file, prosecute, obtain and maintain at its sole expense patent applications and patents relating to PRODUCT RESULTING PROPRIETARY RIGHTS in countries of its choice. POLYMUN agrees that it shall identify and memorialize PRODUCT RESULTING PROPRIETARY RIGHTS for MIRNA and shall deliver such information to MIRNA in a form requested by MIRNA. POLYMUN hereby assigns and conveys to MIRNA all right, title, and interest in and to such PRODUCT RESULTING PROPRIETARY RIGHTS and agrees to execute any and all legal instruments reasonably requested by MIRNA to effect, acknowledge, or perfect such assignment and conveyance. POLYMUN represents and warrants that each and every officer, employee, agent and subcontractor assigned to work for MIRNA hereunder shall have entered into an agreement with POLYMUN for the assignment of relevant PRODUCT RESULTING PROPRIETARY RIGHTS to POLYMUN. In addition, POLYMUN, its agents, and subcontractors shall treat such PRODUCT RESULTING PROPRIETARY RIGHTS confidentially under the provisions of § 9 and shall have no right or license to use such PRODUCT RESULTING PROPRIETARY RIGHTS for any purpose other than as expressly set forth herein to manufacture the PRODUCT. MIRNA will name those employees and consultants of POLYMUN as inventors on patent applications consistent with patent law. However, MIRNA has no obligation whatsoever to compensate such inventors named on such patent application.

4. Regardless of which PARTY generated PLT RESULTING PROPRIETARY RIGHTS, all rights in PLT RESULTING PROPRIETARY RIGHTS shall be the sole and exclusive property of POLYMUN. POLYMUN shall have the right to prepare, file, prosecute, obtain and maintain at its sole expense patent applications and patents relating to PLT RESULTING PROPRIETARY RIGHTS in countries of its choice. Both PARTIES agree that each will identify and memorialize PLT RESULTING PROPRIETARY RIGHTS for itself and the other PARTY. MIRNA hereby assigns and conveys to POLYMUN all right, title, and interest in and to such PLT RESULTING PROPRIETARY RIGHTS and agrees to execute any and all legal instruments reasonably requested by POLYMUN to effect, acknowledge, or perfect such assignment and conveyance. MIRNA represents and warrants that each and every officer, employee, agent and subcontractor assigned to work for MIRNA hereunder shall have entered into an agreement with MIRNA for the assignment of relevant PLT RESULTING PROPRIETARY RIGHTS to MIRNA. In addition, MIRNA, its agents, and subcontractors shall treat such PLT RESULTING PROPRIETARY RIGHTS confidentially under the provisions of § 9 and shall have no right or license to use such PLT RESULTING PROPRIETARY RIGHTS for any purpose other than as expressly set forth herein. POLYMUN will name those employees and consultants of MIRNA as inventors on patent applications consistent with patent law. However, POLYMUN has no obligation whatsoever to compensate such inventors named on such patent application. Notwithstanding the foregoing, and except as set forth herein, POLYMUN and MIRNA may negotiate in good faith license

terms for PLT RESULTING PROPRIETARY RIGHTS at any further point in time. However, POLYMUN shall disclose in writing any such PLT RESULTING PROPRIETARY RIGHTS as soon as practicable or prior to use with the PRODUCT, whichever occurs first, so that MIRNA may have the opportunity to accept its use, provide alternatives or terminate this AGREEMENT at MIRNA's sole discretion.

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5. INGREDIENTS shall be the sole and exclusive property of MIRNA. MIRNA shall have the right to prepare, file, prosecute, obtain and maintain at its sole expense patent applications and patents relating to INGREDIENTS in countries of its choice. In addition, POLYMUN, its agents, and subcontractors shall treat such INGREDIENTS confidentially under the provisions of § 9 and shall have no right or license to use INGREDIENTS for any purpose other than as expressly set forth herein to manufacture the PRODUCT.

§ 3. DEVELOPMENT AND MANUFACTURING ACTIVITIES AND RELATED OBLIGATIONS

1. POLYMUN shall deliver (i) the SUBJECT MATTER OF AGREEMENT in the form of one or more reports about the development and/or manufacture of PRODUCT and (ii) the PRODUCT produced according to this AGREEMENT. A binding SOW, including a production and delivery schedule, is given in Annex 2 of this AGREEMENT. No additional SOW will be effective unless and until it has been agreed to and signed by authorized representatives of both PARTIES. Neither PARTY will make any changes to the SOW, including the PRODUCT SPECIFICATIONS contained therein, without the other PARTY's prior written approval.

2. POLYMUN shall manufacture the PRODUCT hereunder in conformance with the PRODUCT SPECIFICATIONS and in compliance with APPLICABLE LAWS. POLYMUN shall obtain and maintain all necessary licenses, permits or approvals required by APPLICABLE LAWS in connection with the manufacture, storage, and shipment of the PRODUCT, including without limitation permits relating to manufacturing facilities.

3. During the term of this AGREEMENT, both PARTIES shall cooperate closely to facilitate the development and manufacture of the PRODUCT. POLYMUN shall maintain sufficient capacity in POLYMUN's manufacturing facilities and shall apply and assign all necessary personnel, equipment, supplies, and all other appropriate resources at its disposal to perform its obligations under this AGREEMENT. POLYMUN shall take all reasonable steps to ensure that its personnel are properly trained and proficient in the PRODUCT SPECIFICATIONS and manufacturing process and in handling the MATERIALS and the PRODUCT.

4. POLYMUN shall keep MIRNA regularly and periodically informed of the progress of the development and manufacturing activities via meetings and technical reviews. Should POLYMUN experience or anticipate any problems in performing this AGREEMENT, POLYMUN shall immediately notify MIRNA in writing of such problems, their expected duration and the reasons thereof. The PARTIES will consult and agree to a resolution of the problem.

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5. POLYMUN shall not subcontract all or any part of the development or manufacturing activities under this Agreement to third parties without the prior written consent of MIRNA. In any event, POLYMUN shall remain responsible for the performance of its obligations hereunder.

6. POLYMUN will manufacture PRODUCT at its facilities located in Klosterneuburg, Austria, and POLYMUN shall not change the location of such manufacture without MIRNA's prior written consent, not to be unreasonably withheld.

7. The QUALITY AGREEMENT shall govern an quality related matters pertaining to each PARTY's obligations under this AGREEMENT.

§ 4. TERM AND TERMINATION

1. The term of this AGREEMENT begins at the EFFECTIVE DATE and continues until completion of the PROJECT pursuant to the STATEMENT OF WORK or this AGREEMENT is otherwise terminated pursuant to this § 4, whichever is earlier, and may be extended upon written agreement of both PARTIES. Timelines are given in the working schedule described in Annex 2 of this AGREEMENT.

2. MIRNA or POLYMUN may terminate this AGREEMENT upon thirty (30) days prior written notice to the other PARTY if (i) the other PARTY shall become insolvent or (ii) the other PARTY shall make a general assignment for the benefit of creditors, or (iii) the opening of bankruptcy proceedings over the other PARTY is denied for lack of assets. In case of termination by MIRNA for any of the grounds specified in this § 4.21 MIRNA shall have a perpetual, world-wide, non-exclusive license to use any process technology owned by or licensed to POLYMUN to the extent required in order to produce the PRODUCT.

3. MIRNA or POLYMUN may terminate this AGREEMENT at any time for any material breach by the other PARTY of any of the provisions hereof upon thirty (30) days prior written notice to such other PARTY, provided that during such thirty (30) day period the default is not cured to the reasonable satisfaction of the PARTY giving notice. In case of termination by MIRNA for any of the grounds specified in this § 4.3, MIRNA shall have a perpetual, world-wide, non-exclusive license to use any process technology owned by or licensed to POLYMUN to the extent required in order to produce the PRODUCT.

4. In the event of termination of this AGREEMENT pursuant to any of the above provisions, POLYMUN shall have a duty to mitigate its damages, including (a) to cease all development activities for MIRNA pursuant to this AGREEMENT, (b) to take all steps necessary to cancel or to limit to a minimum any commitments with third parties ancillary to the development activities pursuant to this AGREEMENT, (c) to inventory and provide a list to MIRNA of all WORK PRODUCT, and (d) upon request of MIRNA, to promptly deliver to MIRNA all WORK PRODUCT and transfer to MIRNA all drawings, all partially or fully completed deliverables, and all other know-how comprising or forming a basis for or relating to PRODUCT RESULTING PROPRIETARY RIGHTS.

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5. Termination of the AGREEMENT for any reason will not relieve the PARTIES of any obligation accruing prior thereto and will be without prejudice to the rights and remedies of either PARTY with respect to any antecedent breach of the provisions of the AGREEMENT. The following shall survive any termination or expiration of the AGREEMENT and continue to be enforceable: §1, §2, §3.7, §6.4, §6.5, and §§7 through and including 12.

6. Upon the successful conclusion of POLYMUN's development activities under this AGREEMENT, or any extensions thereof, or upon any earlier termination hereof, POLYMUN shall return to MIRNA all MATERIALS and INGREDIENTS. Any MATERIALS shall be the property of MIRNA and, for so long as such MATERIALS are permitted to be in the possession or control of POLYMUN, shall be used by POLYMUN only as directed by MIRNA and only for the purposes of this Agreement. In order to assist MIRNA in the disposition of such MATERIALS and INGREDIENTS, POLYMUN shall, promptly upon the conclusion of the development and manufacturing activities or termination of this AGREEMENT, provide MIRNA with a written inventory of all such MATERIALS and INGREDIENTS. Such inventory shall be in sufficient detail to enable MIRNA to identify and confirm the return of the MATERIALS previously delivered by MIRNA. MIRNA shall further be given reasonable access to the facilities of POLYMUN and any authorized third party contractors of POLYMUN in order to identify and inspect such MATERIALS and INGREDIENTS.

§ 5. PRICE, PAYMENT AND DELIVERY

1. The price for the SUBJECT MATTER OF AGREEMENT is given in Annex 2 of this AGREEMENT including all applicable taxes except sales/use tax. If the PARTIES contract for additional work under this AGREEMENT in furtherance of the SUBJECT MATTER OF AGREEMENT, the amendment(s) to Annex 2 will include the price for such additional work.

2. POLYMUN shall send to MIRNA individual invoices in Euro showing the applicable sales/use tax with a reference to this AGREEMENT within thirty (30) days after the condition for a payment is fulfilled (see the Payment Schedule provided in Annex 2 of this Agreement). MIRNA shall pay the invoiced amounts within thirty (30) days after receipt of a correct invoice. Payment shall be considered made on the date MIRNA transfers the payment to POLYMUN. Payments for undisputed invoiced amounts that are not received within sixty (60) days after MIRNA receives the applicable invoice will be assessed interest at the rate of [***] commencing as on the 31st day after MIRNA receiving the according invoice. MIRNA's payment obligation under this § 5 shall survive any termination or expiration of this AGREEMENT. Payment shall not constitute acceptance of the delivery. Payment shall not prejudice MIRNA's right to return nonconforming PRODUCT, to receive credit or reimbursement for such nonconforming PRODUCT, and/or to receive reimbursement for the costs by then borne by MIRNA to replace the MATERIALS used in the manufacture of the nonconforming PRODUCT.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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3. Reports will be delivered in form of electronic files as well as hard copies. PRODUCT will be stored and packaged at Polymun following all applicable guidelines as set forth in Annex 2. Transport to MIRNA or to a third party indicated by MIRNA will be performed by Polymun FCA by a transport service designated by MIRNA.

§ 6. SHIPPING, STORAGE AND INSPECTION

1. POLYMUN and MIRNA will ensure that PRODUCT will be packaged and shipped pursuant to the QUALITY AGREEMENT, in accordance with recognized standards for the maintenance of the cold chain from POLYMUN's manufacturing facility to a MIRNA-designated facility through an air courier service designated by MIRNA. To permit the proper tracking of such shipments, the air waybill number will be transmitted to MIRNA as soon as practicable after shipment.

2. POLYMUN shall be responsible for testing all PRODUCT prior to shipment to MIRNA for compliance with the PRODUCT SPECIFICATIONS and for maintaining PRODUCT as required for stability and quality testing under the QUALITY AGREEMENT POLYMUN will promptly notify MIRNA of such test results once received. POLYMUN shall retain a sufficient quantity of PRODUCT to perform at least full duplicate quality control testing.

3. MIRNA or its designated consignee will promptly store PRODUCT immediately upon receipt in appropriate cold storage and will, as soon as practicable after receipt of any the PRODUCT, inspect the shipment and advise POLYMUN of conformity with the PRODUCT SPECIFICATIONS.

4. After receipt, MIRNA may arrange for the PRODUCT to be tested by a mutually agreed-upon independent third party to determine whether the PRODUCT SPECIFICATIONS are met. In the event that MIRNA elects to do so, then at the request of either MIRNA or POLYMUN, the PARTIES shall make arrangement to have the independent third party also test a sample from the same PRODUCT lot retained by POLYMUN pursuant to § 6.2. MIRNA will promptly notify POLYMUN of such test results once received.

5. If the testing conducted under §§ 6.2 and/or 6.4 determines that the PRODUCT failed to meet the PRODUCT SPECIFICATIONS, MIRNA will be entitled to receive from POLYMUN as promptly as commercially reasonable (i) a replacement shipment of the PRODUCT and (ii) reimbursement for the cost of the MATERIALS used to manufacture the replacement PRODUCT. MIRNA will use commercially reasonable efforts to supply replacement INGREDIENT to POLYMUN to manufacture the replacement PRODUCT. In the event that MIRNA has paid for any PRODUCT that failed to meet the PRODUCT SPECIFICATIONS, then POLYMUN shall promptly refund such payment to MIRNA. Notwithstanding the foregoing, if the results of testing of POLYMUN's retention sample pursuant to Section 6.4 indicate that the PRODUCT does meet the PRODUCT SPECIFICATIONS, POLYMUN and MIRNA will use good faith efforts to resolve the discrepancy and make a determination as to the suitability of the shipment and allocation between the PARTIES of the cost for replacement PRODUCT and MATERIALS.

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6. MIRNA, on behalf of itself and/or its Affiliates may arrange for cGMP compliance audits to be conducted at POLYMUN's manufacturing facilities. MIRNA will give POLYMUN not less than forty-five (45) days' notice prior to conduct of such audits, unless POLYMUN agrees to a lesser period of time. MIRNA will not conduct or permit its Affiliates to conduct 'no-notice' audits of POLYMUN's manufacturing facilities.

§ 7. WARRANTIES; INDEMNIFICATION; INSURANCE

1. POLYMUN warrants that it (i) is the unrestricted owner of the BACKGROUND RIGHTS OF POLYMUN and the POLYMUN KNOW-HOW and (ii) that it can freely dispose of it and it has all rights necessary to use the BACKGROUND RIGHTS OF POLYMUN and the POLYMUN KNOW-HOW to manufacture the PRODUCT.

2. POLYMUN warrants the completeness and accuracy of its INFORMATION relating to the BACKGROUND RIGHTS OF POLYMUN, the POLYMUN KNOW-HOW, and the SUBJECT MATTER OF AGREEMENT.

3. MIRNA warrants that to the best of its knowledge it is entitled to provide the INGREDIENTS and the liposomal delivery technology known as NOV340 owned by Marina Biotech, Inc. for the PRODUCT under this AGREEMENT (the "NOV340 TECHNOLOGY").

4. Except to the extent that POLYMUN is entitled to be indemnified by POLYMUN pursuant to § 7.5, POLYMUN hereby agrees to indemnify, defend and hold harmless MIRNA from any claim or liability arising out of: (i) [***]; or (ii) POLYMUN's gross negligence or intentional misconduct in the performance of its obligations hereunder.

5. Except to the extent that MIRNA is entitled to be indemnified by POLYMUN pursuant to § 7.41 MIRNA hereby agrees to indemnify, defend and hold harmless POLYMUN from any claim or liability arising out of (i) the use and/or distribution of the PRODUCT by MIRNA, including but not limited to use in preclinical and clinical studies; (ii) claims or liability relating to [***]; or (iii) MIRNA's gross negligence or intentional misconduct in the performance of its obligations hereunder.

6. The PARTY seeking indemnification ("INDEMNIFIED PARTY") pursuant to this Section 7 shall promptly provide notice to the indemnifying PARTY ("INDEMNIFYING PARTY") of such claim in reasonable detail, provided that the failure to provide such notice shall not affect the obligations of the INDEMNIFYING PARTY unless and only to the extent said INDEMNIFYING PARTY is actually materially prejudiced thereby. The INDEMNIFIED PARTY shall furnish promptly to the INDEMNIFYING PARTY copies of all papers and official documents received in respect of any claim. Commencing within thirty (30) days after receipt of the aforesaid notice, the INDEMNIFYING PARTY shall undertake, conduct and control, through counsel of its own choosing (but reasonably acceptable to the INDEMNIFIED PARTY) and at its own expense, the settlement or defense of the claim, provided that the INDEMNIFIED PARTY may participate in such settlement or defense through counsel chosen by the INDEMNIFIED PARTY, at the expense of the INDEMNIFIED PARTY and reasonably

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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acceptable to the INDEMNIFYING PARTY. The INDEMNIFYING PARTY shall not, without the prior written consent of the INDEMNIFIED PARTY, which consent shall not be unreasonably withheld, settle or compromise any claim, unless such settlement or compromise includes an unconditional release of the INDEMNIFIED PARTY. The INDEMNIFYING PARTY and the INDEMNIFIED PARTY shall cooperate fully in all aspects of any investigation, defense, pre-trial activities, trial, compromise, settlement or discharge of any claim in respect of which indemnity is sought pursuant to this § 7.6, including, but not limited to, providing the other PARTY with reasonable access to employees and officers (including as witnesses) and other information.

7. POLYMUN shall procure and maintain throughout the term of this AGREEMENT property, casualty, and liability insurance, with such types and amounts of coverage as are customary in the industry (but with limits of no less than [***] per occurrence and [***] in the aggregate providing coverage on a worldwide basis for occurrences and claims made), covering POLYMUN's manufacturing activities hereunder and all MATERIALS and PRODUCT intended for manufacture or supply provided by MIRNA to POLYMUN pursuant to this AGREEMENT. Within ten (10) days of any change of insurer, POLYMUN shall provide MIRNA notice of such change. Upon request, POLYMUN shall provide MIRNA with evidence that such insurance is in effect.

§ 8. MAINTENANCE OF THE BACKGROUND RIGHTS

POLYMUN shall maintain the BACKGROUND RIGHTS OF POLYMUN and MIRNA shall maintain the BACKGROUND RIGHTS OF MIRNA during the term of this AGREEMENT, each at its own cost.

§ 9. CONFIDENTIALITY

1. POLYMUN and MIRNA agree that during the term of this Agreement and for a period of ten (10) years after MIRNA notifies POLYMUN that MIRNA's license with Marina Biotech, Inc. to the NOV340 technology has expired or terminated, a Party receiving INFORMATION of the other Party shall (i) maintain in confidence such INFORMATION; (ii) not disclose such INFORMATION to any third party without prior written consent of the disclosing Party, except as permitted in the this Section 9; and (iii) not use such INFORMATION for any purpose other than its performance under this Agreement; provided, however, that MIRNA in its sole discretion shall not be required to keep WORK PRODUCT, PRODUCT RESULTING PROPRIETARY RIGHTS or the PRODUCT confidential. The INFORMATION will be transferred by the receiving PARTY only to its employees to the extent necessary for the implementation of this AGREEMENT, who are themselves obliged to written obligations of confidentiality at least as restrictive as those contained in this Agreement.

2. The obligation for confidentiality does not apply to INFORMATION that:

   a) the receiving PARTY already possess, as evidenced by its written records, prior to receipt from the disclosing PARTY;

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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   b) is now, or hereafter becomes, generally available to the public through no fault of the receiving PARTY, or any entity that obtained such information or materials from the receiving PARTY;

   c) is obtained without restriction from a third party that had the legal right to disclose the same to the receiving PARTY; or

   d) has been independently developed by the receiving PARTY without the aid, application or use of any INFORMATION of the disclosing PARTY, as demonstrated by competent written proof.

   If, based on the advice of legal counsel skilled in the subject matter, a PARTY is required to disclose specific INFORMATION of the other Party to comply with an applicable law, regulation, legal process, or order of a government authority or court of competent jurisdiction, the PARTY may disclose such INFORMATION only to the entity or person required to receive such disclosure; provided, however, that the PARTY required to disclose such INFORMATION shall (a) to the extent permitted by such law, regulation, process order or rules, first have given prompt (but in no event less than five (5) business days) advance notice to such other PARTY to enable it to seek any available exemptions from or limitations on such disclosure requirement

and shall reasonably cooperate in such efforts by the other PARTY; (b) furnish only the portion of the INFORMATION which is legally required to be disclosed; (c) use all reasonable efforts to secure confidential protection of such INFORMATION; and (d) continue to perform its obligations of confidentiality and non-use set out in this Section 9.

3. It is understood and agreed that MIRNA shall be free to use the MATERIALS, INGREDIENTS, PRODUCT and WORK PRODUCT for its own purposes and that such MATERIALS, INGREDIENTS, PRODUCT AND WORK PRODUCT shall be treated by POLYMUN as confidential hereunder.

4. Each PARTY's confidentiality obligation shall survive for ten (10) years from expiration or termination of this AGREEMENT. Notwithstanding the foregoing, either PARTY may disclose the existence, terms and conditions of this AGREEMENT to prospective investors, provided that any such party to whom disclosure is permitted has agreed to keep such information confidential subject to written terms at least as restrictive as those contained herein.

§ 10. FORCE MAJEURE

No PARTY shall be liable to the other PARTY in damages or otherwise by reason of any failure or delay in performance of this AGREEMENT if such delay or failure is due to any event beyond the control of the PARTIES, including, without limitation, fire, explosion, weather, disease, war, acts of terrorism, insurrection, civil strife, riots, government action or power failure, provided, however, that the PARTY who is unable to perform resumes performance as soon as possible following the end of the event causing delay or failure. Any deadline or time for performance specified in this AGREEMENT which falls due during or subsequent to the occurrence of any of the events referred to above shall be automatically extended for a period of time equal to the period of delay caused by any such event; provided, however, that in the event such delay exceed sixty (60) days, the non-delaying PARTY may terminate this AGREEMENT upon notice to the other PARTY.

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§ 11. GOVERNING LAW AND DISPUTE RESOLUTION

This AGREEMENT shall be construed and governed in accordance with the laws of Delaware, without giving effect to conflict of law provisions of any jurisdiction. In the event that a PARTY to this AGREEMENT perceives the existence of a dispute with the other PARTY concerning any right or duty provided for herein, the President, Chief Executive Officer or designee with authority to resolve the dispute completely, of each of the PARTIES will, as soon as practicable, confer in an attempt to resolve the dispute. Any and all claims, disputes or controversies arising under, out of, or in connection with this AGREEMENT, which have not been resolved in good faith negotiations between the PARTIES shall be resolved in accordance with the rules, then in effect, of the American Arbitration Association. The PARTIES shalt share equally the cost of the arbitrators. Unless agreed in writing otherwise, the dispute shall be resolved by a board of three (3) arbitrators. If the arbitration is [***]. Such independent arbitration shall be conducted by arbitrator(s) of sufficient education, scientific experience and national reputation to address such issues. Unless agreed in writing otherwise, the board shall be composed of one arbitrator selected by MIRNA, one selected by POLYMUN and one selected by MIRNA and POLYMUN. If MIRNA and POLYMUN cannot agree upon the third arbitrator within fourteen (14) days after the notice of arbitration, the third arbitrator shall be selected by the American Arbitration Association in accordance with its rules. The decision of such panel shall be final and binding upon the PARTIES and enforceable in any court of competent jurisdiction.

§ 12. MISCELLANEOUS

1. This AGREEMENT shall be executed in two (2) copies in the English language. Each PARTY shall receive a duly signed copy. All annexes listed in this AGREEMENT form an integral part thereof.

2. The acts to be taken by each PARTY are undertaken by it as an independent contractor and not as an agent or partner of the other PARTY. Neither PARTY shall enter into or incur, or hold itself out to third parties as having authority to enter into or incur, on behalf of the other PARTY, any contractual obligations, expenses, or liabilities whatsoever.

3. Should any provision of this AGREEMENT or any provision subsequently inserted into it be or become completely or partially invalid or impracticable, the validity of the remainder of the provisions of the AGREEMENT shall not be affected thereby. The same shall apply should the AGREEMENT contain an unintended gap. The invalid or impracticable provision shall be replaced by, and the gap shall be closed by an appropriate provision which to the extent legally permissible comes closest to what the PARTIES wanted or would have wanted in view of the purpose and intent of this AGREEMENT if they had considered the point when concluding this AGREEMENT, or subsequently inserting the provision into it.

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

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4. Without the prior written consent of MIRNA, POLYMUN is not entitled to transfer/assign any rights/obligations under this AGREEMENT to a third party. MIRNA may transfer or assign any rights/obligations under this AGREEMENT without consent of POLYMUN.

5. Any notice of legal content must be sent in writing by registered mail or global courier service to the company address set forth in the preamble of this AGREEMENT to PARTY set forth below. Notice shall be deemed given upon confirmed delivery. As to MIRNA, notices shall be sent to President and CEO with a copy to General Counsel; as to POLYMUN notices shall be sent to the CEO.

6. No verbal subsidiary agreements have been made. Modifications/amendments to or extensions of this AGREEMENT are only valid if in writing and signed by authorized representatives for and on behalf of both PARTIES.

7. This AGREEMENT supersedes all prior agreements, arrangements and undertakings, relating to the subject hereof between the PARTIES save and except (i) the Confidential Disclosure Agreement between the PARTIES from 25th of July 2011, which shall govern the exchange of confidential information between the PARTIES prior to the EFFECTIVE DATE hereof, (ii) the Agreement for a Feasibility Study of a Liposomal Formulation from 18th of January 2012, (iii) the Agreement for Development and Manufacturing of a Liposomal Formulation from 19th of March 2012, and (iv) the Agreement for Development and Manufacturing of a Liposomal Formulation from 13th of July 2012.

For MIRNA THERAPEUTICS, INC.: For POLYMUN:

/s/ Paul Lammers	16 Nov, 2012	/s/ Dietmar Katinger	18.11.2012
(signature/date)		(signature/date)	
Paul Lammers, MD, MSc; President & CEO		Dr. Dietmar Katinger; CEO	

Annex 1: POLYMUN Patents
Annex 2: Statement of Work (including Product Specifications and Pricing Schedule)

Annex 1

POLYMUN Patents

Title: Method and Device for Producing Lipid Vesicles

Country/Region	Application Date	Patent No.	Date of Grant	Expiration Date
Australia	31. October 2001	AU 2002215987	10. August 2006	31. October 2021
Canada	31. October 2001	CA 2,427,640	5. September 2006	31. October 2021
Europe	31. October 2001	EP 1 337 322	9. June 2004	31. October 2021
USA	28. August 2003	US 6,843,942	18. January 2005	31. October 2021

Annex 2

Statement of Work

(statement of work follows)

SOW-PS003

SCOPE OF WORK (SOW)

Manufacturing Development and Production of MRX01

POLYMUN: Polymun Scientific Immunbiologische Forschung GmbH
Donaustraße 99
3400 Klosterneuburg, Austria

MIRNA: Mirna Therapeutics, Inc.
2150 Woodward, Suite 100
Austin, TX 78744

SOW #: PS003
VERSION: A
DATE: November 16, 2012

Scope of Work Acceptance: With the signatures below, POLYMUN and MIRNA hereby accept SOW-PS003-A.

Mirna Therapeutics, Inc

/s/ Dr. Paul Lammers	11/16/2012
Signature	Date

Name: Dr. Paul Lammers
Title: President & CEO

Polymun Scientific Immunbiologische Forschung GmbH

/s/ Dietmar Katinger	18.11.2012
Signature	Date

Name: Dietmar Katinger
Title: CEO

Contents

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SOW-PS005

This Scope of Work is governed by the Agreement for Development and Manufacturing of a Liposomal Formulation from July 2012 between POLYMUN and MIRNA.

Scope of Work

The Scope of Work for developing the drug candidate MRX34 ("PRODUCT") will be divided into 3 sections

· [***]

Each stage will have defined deliverables as detailed below. Upon initiation of the contract, POLYMUN and MIRNA will develop a target schedule of activities that will govern the project. This timeline will be reviewed at least monthly to track the project progress.

Product

The PRODUCT is a liposomal formulation of a mimic of miR-34a (INGREDIENT), which employs the SMARTICLE formulation NOV340. The Target Specification for the PRODUCT is defined in **Error! Reference source not found.**.

INGREDIENT:

The INGREDIENT is a mimic of miR-34a, [***].

[***]

Payment Schedule

[***]

[***] Four pages in this document have been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Exhibit 1 — Product Specifications

Assay	Method	Specification
[***]	[***]	[***]

[***] Certain information in this document has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portions.

Exhibit 10.8(A)

MIRNA THERAPEUTICS, INC.

2008 LONG TERM INCENTIVE PLAN

FIRST AMENDMENT

TO THE

MIRNA THERAPEUTICS, INC.

2008 LONG TERM INCENTIVE PLAN

This First Amendment to the Mirna Therapeutics, Inc. 2008 Long Term Incentive Plan (the "**Plan**") is made by Mirna Therapeutics, Inc., a Delaware corporation (the "**Company**").

WHEREAS, the Company has established the Plan in order to attract and retain able persons as employees, directors and consultants of the Company, its parent and its subsidiaries;

WHEREAS, Section 10(f) of the Plan provides that the Company may amend the Plan under certain circumstances; and

WHEREAS, the Company desires to enter into this First Amendment to reduce the number of shares of common stock, par value $0.001, of the Company (the "**Stock**"), reserved and available for issuance in connection with awards under the Plan.

NOW, THEREFORE, Section 4(a) of the Plan is amended in its entirety, effective as of November 3, 2009, as follows:

> Overall Number of Shares Available for Delivery. Subject to adjustment in a manner consistent with any adjustment made pursuant to Section 9, the total number of shares of Stock reserved and available for issuance in connection with Awards under this Plan shall not exceed 1,500,000 shares.

IN WITNESS WHEREOF, a duly authorized officer of the Company has executed this First Amendment as set forth below.

MIRNA THERAPEUTICS, INC.

By: /S/ LYNNE HOHLFELD
Name: Lynne Hohlfeld
Title: Chief Financial Officer
Date: November 3, 2009

SECOND AMENDMENT

TO THE

MIRNA THERAPEUTICS, INC.

2008 LONG TERM INCENTIVE PLAN

This Second Amendment to the Mirna Therapeutics, Inc. 2008 Long Term Incentive Plan, as amended (the "**Plan**"), is made by Mirna Therapeutics, Inc., a Delaware corporation (the "**Company**").

WHEREAS, the Company has established the Plan in order to attract and retain able persons as employees, directors and consultants of the Company, its parent and its subsidiaries;

WHEREAS, Section 10(f) of the Plan provides that the Company may amend the Plan under certain circumstances; and

WHEREAS, the Company desires to enter into this Second Amendment to increase the number of shares of common stock, par value $0.001, of the Company, reserved and available for issuance in connection with awards under the Plan.

NOW, THEREFORE, Section 4(a) of the Plan is amended in its entirety, effective as of October 22, 2012, as follows:

> Overall Number of Shares Available for Delivery. Subject to adjustment in a manner consistent with any adjustment made pursuant to Section 9, the total number of shares of Stock reserved and available for issuance in connection with Awards under this Plan shall not exceed 4,958,740 shares.

IN WITNESS WHEREOF, a duly authorized officer of the Company has executed this Second Amendment as set forth below.

MIRNA THERAPEUTICS, INC.

By: /S/ LYNNE HOHLFELD
Name: Lynne Hohlfeld
Title: Chief Financial Officer
Date: October 22, 2012

THIRD AMENDMENT
TO THE
MIRNA THERAPEUTICS, INC.
2008 LONG TERM INCENTIVE PLAN

This Third Amendment to the Mirna Therapeutics, Inc. 2008 Long Term Incentive Plan, as amended (the "**Plan**"), is made by Mirna Therapeutics, Inc., a Delaware corporation (the "**Company**").

WHEREAS, the Company has established the Plan in order to attract and retain able persons as employees, directors and consultants of the Company, its parent and its subsidiaries;

WHEREAS, Section 10(f) of the Plan provides that the Company may amend the Plan under certain circumstances; and

WHEREAS, the Company desires to enter into this Second Amendment to increase the number of shares of common stock, par value $0.001, of the Company, reserved and available for issuance in connection with awards under the Plan.

NOW, THEREFORE, Section 4(a) of the Plan is amended in its entirety, effective as of December 31, 2013, as follows:

> Overall Number of Shares Available for Delivery. Subject to adjustment in a manner consistent with any adjustment made pursuant to Section 9, the total number of shares of Stock reserved and available for issuance in connection with Awards under this Plan shall not exceed 8,321,740 shares.

IN WITNESS WHEREOF, a duly authorized officer of the Company has executed this Third Amendment as set forth below.

MIRNA THERAPEUTICS, INC.

By: /s/ Jon Irvin

Name: Jon Irvin
Title: Chief Financial Officer
Date: December 31, 2013

FOURTH AMENDMENT

TO THE
MIRNA THERAPEUTICS, INC.
2008 LONG TERM INCENTIVE PLAN

This Fourth Amendment to the Mirna Therapeutics, Inc. 2008 Long Term Incentive Plan, as amended (the "**Plan**"), is made by Mirna Therapeutics, Inc., a Delaware corporation (the "**Company**").

WHEREAS, the Company has established the Plan in order to attract and retain able persons as employees, directors and consultants of the Company, its parent and its subsidiaries;

WHEREAS, Section 10(f) of the Plan provides that the Company may amend the Plan under certain circumstances; and

WHEREAS, the Company desires to enter into this Fourth Amendment to increase the number of shares of common stock, par value $0.001, of the Company, reserved and available for issuance in connection with awards under the Plan.

NOW, THEREFORE, Section 4(a) of the Plan is amended in its entirety, effective as of March 10, 2014, as follows:

> Overall Number of Shares Available for Delivery. Subject to adjustment in a manner consistent with any adjustment made pursuant to Section 9, the total number of shares of Stock reserved and available for issuance in connection with Awards under this Plan shall not exceed 10,049,028 shares.

IN WITNESS WHEREOF, a duly authorized officer of the Company has executed this Fourth Amendment as set forth below.

MIRNA THERAPEUTICS, INC.

By: /s/ Jon Irvin

Name: Jon Irvin
Title: Chief Financial Officer
Date: March 10, 2014

TABLE OF CONTENTS

MIRNA THERAPEUTICS, INC.

2008 Long Term Incentive Plan

1. Purpose. The purpose of the Mirna Therapeutics, Inc. 2008 Long Term Incentive Plan (the "***Plan***") is to provide a means through which Mirna Therapeutics, Inc., a Delaware corporation (the "***Company***"), and its Parent and Subsidiaries may attract and retain able persons as employees, directors and consultants of the Company, its Parent and its Subsidiaries, and to provide a means whereby those persons upon whom the responsibilities of the successful administration and management of the Company, its Parent and its Subsidiaries, rest, and whose present and potential contributions to the welfare of the Company, its Parent and its Subsidiaries, are of importance, can acquire and maintain stock ownership, or awards the value of which is tied to the performance of the Company, thereby strengthening their concern for the welfare of the Company, its Parent and its Subsidiaries, and their desire to remain employed. A further purpose of this Plan is to provide such employees, directors and consultants with additional incentive and reward opportunities designed to enhance the profitable growth of the Company. Accordingly, this Plan primarily provides for the granting of Incentive Stock Options, options which do not constitute Incentive Stock Options, Restricted Stock Awards, Restricted Stock Units, Stock Appreciation Rights or any combination of the foregoing, as is best suited to the circumstances of the particular individual as provided herein.

2. Definitions. For purposes of this Plan, the following terms shall be defined as set forth below, in addition to such terms defined in Section 1 hereof:

(a) "***Annual Incentive Award***" means a conditional right granted to a Participant under Subsection 8(c) hereof to receive a cash payment, Stock or other Award, unless otherwise determined by the Committee, after the end of a specified year.

(b) "***Award***" means any Option, SAR (including Limited SAR), Restricted Stock Award, Restricted Stock Unit, Bonus Stock, Dividend Equivalent, Other Stock-Based Award, Performance Award or Annual Incentive Award, together with any other right or interest granted to a Participant under this Plan.

(c) "***Beneficiary***" means one or more persons, trusts or other entities which have been designated by a Participant, in his or her most recent written beneficiary designation filed with the Committee, to receive the benefits specified under this Plan upon such Participant's death or to which Awards or other rights are transferred if and to the extent permitted under Subsection 10(b) hereof. If, upon a Participant's death, there is no designated Beneficiary or surviving designated Beneficiary, then the term Beneficiary means the persons, trusts or other entities entitled by will or the laws of descent and distribution to receive such benefits.

(d) "***Board***" means the Company's Board of Directors.

(e) "***Business Day***" means any day other than a Saturday, a Sunday, or a day on which banking institutions in the state of Texas are authorized or obligated by law or executive order to close.

(f) "***Change in Control***" means the occurrence of any of the following events:

(i) A "change in the ownership of the Company" which shall occur on the date that any one person, or more than one person acting as a group, acquires ownership of stock in the Company that, together with stock held by such person or group, constitutes more than 50% of the total fair market value or total voting power of the stock of the Company; provided, however, if any one person or more than one person acting as a group, is considered to own more than 50% of the total fair market value or total voting power of the stock of the Company, the acquisition of additional stock by the same person or persons will not be considered a "change in the ownership of the Company" (or to cause a "change in the effective control of the Company" within the meaning of Subsection 2(f)(ii) below) and an increase of the effective percentage of stock owned by any one person, or persons acting as a group, as a result of a transaction in which the Company acquires its stock in exchange for property will be treated as an acquisition of stock for purposes of this paragraph; provided, further, however, that for purposes of this Subsection 2(f)(i), the following acquisitions shall not constitute a Change in Control: (1) any acquisition by any employee benefit plan (or related trust) sponsored or maintained by the Company or any entity controlled by the Company, or (2) any acquisition by investors of preferred stock, common stock or other stock or similar securities of the Company or any security convertible or exchangeable into or for preferred stock, common stock or other stock or similar securities of the Company for cash in any financing transaction or series of related financing transactions, as determined by the Committee in its sole discretion. This Subsection 2(f)(i) applies only when there is a transfer of the stock of the Company (or issuance of stock) and stock in the Company remains outstanding after the transaction.

(ii) A "change in the effective control of the Company" which shall occur on the date that either (A) any one person, or more than one person acting as a group, acquires (or has acquired during the twelve month period ending on the date of the most recent acquisition by such person or persons) ownership of stock of the Company possessing 35% or more of the total voting power of the stock of the Company, except for (1) any acquisition by any employee benefit plan (or related trust) sponsored or maintained by the Company or any entity controlled by the Company, or (2) any acquisition by investors of preferred stock, common stock or other stock or similar securities of the Company or any security convertible or exchangeable into or for preferred stock, common stock or other stock or similar securities of the Company for cash in any financing transaction or series of related financing transactions, as determined by the Committee in its sole discretion; or (B) a majority of the members of the Board are replaced during any twelve-month period by directors whose appointment or election is not endorsed by a majority of the members of the Board prior to the date of the appointment or election. For purposes of a "change in the effective control of the Company," if any one person, or more than one person acting as a group, is considered to effectively control the Company within the meaning of this Subsection 2(f)(ii), the acquisition of additional control of the Company by the same person or persons is not considered a "change in the effective control of the Company," or to cause a "change in the ownership of the Company" within the meaning of Subsection 2(f)(i) above.

(iii) A "change in the ownership of a substantial portion of the Company's assets" which shall occur on the date that any one person, or more than one person

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acting as a group, acquires (or has acquired during the twelve month period ending on the date of the most recent acquisition by such person or persons) assets of the Company that have a total gross fair market value equal to or more than 40% of the total gross fair market value of all the assets of the Company immediately prior to such acquisition or acquisitions. For this purpose, gross fair market value means the value of the assets of the Company, or the value of the assets being

disposed of, determined without regard to any liabilities associated with such assets. Any transfer of assets to an entity that is controlled by the shareholders of the Company immediately after the transfer, as provided in guidance issued pursuant to the Nonqualified Deferred Compensation Rules, shall not constitute a Change in Control.

For purposes of this Subsection 2(f), the provisions of section 318(a) of the Code regarding the constructive ownership of stock will apply to determine stock ownership; provided, that, stock underlying unvested options (including options exercisable for stock that is not substantially vested) will not be treated as owned by the individual who holds the option. In addition, for purposes of this Subsection 2(f) and except as otherwise provided in an Award agreement, "Company" includes (x) the Company, (y) the entity for whom a Participant performs the services for which an Award is granted, and (z) an entity that is a stockholder owning more than 50% of the total fair market value and total voting power (a "***Majority Shareholder***") of the Company or the entity identified in (y) above, or any entity in a chain of entities in which each entity is a Majority Shareholder of another entity in the chain, ending in the Company or the entity identified in (y) above.

(g) "***Detrimental Activity***" means any one or more of the following activities in which the Committee determines in its sole and absolute discretion that an employee has engaged without the written consent of the Company: (i) breach or violation of any employment-related agreement between the employee and the Company, its Parent or any Subsidiary of the Company; (ii) breach or violation of any other written agreement or release of claims between the employee and the Company, its Parent or any Subsidiary of the Company; (iii) violation of a written policy of the Company, its Parent or any Subsidiary of the Company which violation is determined by the Committee in its sole discretion to be detrimental to the Company, its Parent or any Subsidiary of the Company; (iv) improper use or disclosure, either during or subsequent to the employee's employment with the Company, its Parent or any Subsidiary of the Company, of any proprietary or confidential information of the Company, its Parent or any Subsidiary of the Company; (v) conviction of, or entering a guilty plea with respect to, any felony crime, whether or not connected with the Company, its Parent or any Subsidiary of the Company; (vi) entering into employment or a consulting relationship with a competitor of the Company, its Parent or any Subsidiary of the Company under circumstances suggesting that such employee will be using unique or special knowledge gained as an employee of the Company, its Parent or any Subsidiary of the Company to compete with the Company, its Parent or any Subsidiary of the Company; (vii) solicitation or attempted solicitation of employees from the Company, its Parent or any Subsidiary of the Company; (viii) use of information obtained during the course of the employee's employment with the Company, its Parent or any Subsidiary of the Company for the employee's own purposes, such as for the solicitation of business; (ix) engaging in either gross misconduct or criminal activity harmful to the Company, its Parent or any Subsidiary of the Company; or (x) any other action that materially harms the business interests, reputation, or goodwill of the Company, its Parent or any Subsidiary of the Company.

(h) "***Code***" means the Internal Revenue Code of 1986, as amended from time to time, including regulations thereunder and successor provisions and regulations thereto.

(i) "***Committee***" means a committee of two or more directors designated by the Board to administer this Plan; provided, however, that, unless otherwise determined by the Board, the Committee shall consist solely of two or more directors, each of whom shall be (i) a "nonemployee director" within the meaning of Rule 16b-3, and (ii) an "outside director" as defined under section 162(m) of the Code unless administration of this Plan by "outside directors" is not then required in order to qualify for tax deductibility under section 162(m) of the Code.

(j) "***Covered Employee***" means an Eligible Person who is a Covered Employee as specified in Subsection 8(e) of this Plan.

(k) "***Dividend Equivalent***" means a right, granted to a Participant under Subsection 6(g), to receive cash, Stock, other Awards or other property equal in value to dividends paid with respect to a specified number of shares of Stock, or other periodic payments.

(l) "***Effective Date***" means May 15, 2008.

(m) "***Eligible Person***" means all officers and employees of the Company, its Parent or of any Subsidiary, and other persons who provide services to the Company, its Parent or any of the Subsidiaries of the Company, including directors of the Company. An employee on leave of absence may be considered as still in the employ of the Company, its Parent or a Subsidiary for purposes of eligibility for participation in this Plan. In addition, the Committee may designate such other Persons as eligible to receive an Award provided that the issuance of any Stock pursuant to such Award is exempt from registration under the Securities Act; and provided further that such other Persons shall not be entitled to receive Incentive Stock Options.

(n) "***Exchange Act***" means the Securities Exchange Act of 1934, as amended from time to time, including rules thereunder and successor provisions and rules thereto.

(o) "***Fair Market Value***" means, as of any specified date, (i) the mean of the high and low sales prices of the Common Stock either (A) if the Stock is traded on the National Market System of the NASDAQ, as reported on the National Market System of NASDAQ on that date (or if no sales occur on that date, on the last preceding date on which such sales of the Stock are so reported), or (B) if the Stock is listed on a national securities exchange, as reported on the stock exchange composite tape on that date (or if no sales occur on that date, on the last preceding date on which such sales of the Stock are so reported); (ii) if the Stock is not traded on the National Market System of the NASDAQ or a national securities exchange but is traded over the counter at the time a determination of its fair market value is required to be made under the Plan, the average between the reported high and low or closing bid and asked prices of Stock on the most recent date on which Stock was publicly traded; (iii) in the event Stock is not publicly traded at the time a determination of its value is required to be made under the Plan, the amount determined by the Committee in its discretion in such manner as it deems appropriate; or (iv) on the date of an initial public offering of Stock, the offering price under such initial public offering.

(p) "***Incentive Stock Option***" or "***ISO***" means any Option intended to be and designated as an incentive stock option within the meaning of section 422 of the Code or any successor provision thereto.

(q) "***Nonqualified Deferred Compensation Rules***" means the limitations or requirements of section 409A of the Code and the regulations promulgated thereunder.

(r) "***Option***" means a right, granted to a Participant under Subsection 6(b) hereof, to purchase Stock or other Awards at a specified price during specified time periods.

(s) "***Other Stock-Based Awards***" means Awards granted to a Participant under Subsection 6(i) hereof.

(t) "***Parent***" means Asuragen, Inc. or any other corporation or other entity that owns, directly or indirectly, a majority of the voting power of voting equity securities or equity interest of the Company.

(u) "***Participant***" means a person who has been granted an Award under this Plan which remains outstanding, including a person who is no longer an Eligible Person.

(v) "***Performance Unit***" means a right, granted to a Participant under Section 8 hereof, to receive Awards based upon performance criteria specified by the Committee.

(w) "***Person***" means any person or entity of any nature whatsoever, specifically including an individual, a firm, a company, a corporation, a partnership, a limited liability company, a trust or other entity; a Person, together with that Person's Affiliates and Associates (as those terms are defined in Rule 12b-2 under the Exchange Act), and any Persons acting as a partnership, limited partnership, joint venture, association, syndicate or other group (whether or not formally organized), or otherwise acting jointly or in concert or in a coordinated or consciously parallel manner (whether or not pursuant to any express agreement), for the purpose of acquiring, holding, voting or disposing of securities of the Company with such Person, shall be deemed a single "Person."

(x) "***Qualifying Public Offering***" shall mean a firm commitment underwritten public offering of Stock for cash where the shares of Stock registered under the Securities Act are listed on a national securities exchange or the NASDAQ National Market System.

(y) "***Qualified Member***" means a member of the Committee who is a "nonemployee Director" within the meaning of Rule 16b-3(b)(3) and an "outside director" within the meaning of Treasury Regulation 1.162-27 under section 162(m) of the Code.

(z) "***Restricted Stock***" means Stock granted to a Participant under Subsection 6(d) hereof, that is subject to certain restrictions and to a risk of forfeiture.

(aa) "***Restricted Stock Unit***" means a right, granted to a Participant under Subsection 6(e) hereof, to receive Stock, cash or a combination thereof at the end of a specified deferral period.

(bb) "***Rule 16b-3***" means Rule 16b-3, promulgated by the Securities and Exchange Commission under section 16 of the Exchange Act, as from time to time in effect and applicable to this Plan and Participants.

(cc) "***Securities Act***" means the Securities Act of 1933 and the rules and regulations promulgated thereunder, or any successor law, as it may be amended from time to time.

(dd) "***Service***" means an employee's service in his or her status as an employee of the Company, its Parent or a Subsidiary of the Company or of a corporation, or parent or subsidiary of such corporation, assuming or substituting a new award for an Award granted under this Plan.

(ee) "***Stock***" means the Company's Common Stock, par value $0.001 per share, and such other securities as may be substituted (or resubstituted) for Stock pursuant to Section 9.

(ff) "***Stock Appreciation Rights***" or "***SAR***" means a right granted to a Participant under Subsection 6(c) hereof.

(gg) "***Subsidiary***" means with respect to the Company, any corporation or other entity of which a majority of the voting power of the voting equity securities or equity interest is owned, directly or indirectly, by the Company.

3. Administration.

(a) Authority of the Committee. This Plan shall be administered by the Committee except to the extent the Board elects to administer this Plan, in which case references herein to the "***Committee***" shall be deemed to include references to the "***Board***." Subject to the express provisions of the Plan and Rule 16b-3, the Committee shall have the authority, in its sole and absolute discretion, to (i) adopt, amend, and rescind administrative and interpretive rules and regulations relating to the Plan; (ii) determine the Eligible Persons to whom, and the time or times at which, Awards shall be granted; (iii) determine the amount of cash and the number of shares of Stock, Stock Appreciation Rights, Restricted Stock Units or Restricted Stock Awards, or any combination thereof, that shall be the subject of each Award; (iv) determine the terms and provisions of each Award agreement (which need not be identical), including provisions defining or otherwise relating to (A) the term and the period or periods and extent of exercisability of the Options, (B) the extent to which the transferability of shares of Stock issued or transferred pursuant to any Award is restricted, (C) except as otherwise provided herein, the effect of termination of employment, or the service relationship with the Company, of a Participant on the Award, and (D) the effect of approved leaves of absence (consistent with any applicable regulations of the Internal Revenue Service); (v) accelerate the time of exercisability of any Award that has been granted; (vi) construe the respective Award agreements and the Plan; (vii) make determinations of the Fair Market Value of the Stock pursuant to the Plan; (viii) delegate its duties under the Plan to such agents as it may appoint from time to time, provided that the Committee may not delegate its duties with respect to making Awards to, or otherwise with respect to Awards granted to, Eligible Persons who are subject to section 16(b) of

the Exchange Act or section 162(m) of the Code; and (ix) make all other determinations, perform all other acts, and exercise all other powers and authority necessary or advisable for administering the Plan, including the delegation of those ministerial acts and responsibilities as the Committee deems appropriate. Subject to Rule 16b-3 and section 162(m) of the Code, the Committee may correct any defect, supply any omission, or reconcile any inconsistency in the Plan, in any Award, or in any Award agreement in the manner and to the extent it deems necessary or desirable to carry the Plan into effect, and the Committee shall be the sole and final judge of that necessity or desirability. The determinations of the Committee on the matters referred to in this Subsection 3(a) shall be final and conclusive.

(b) Manner of Exercise of Committee Authority. At any time that a member of the Committee is not a Qualified Member, any action of the Committee relating to an Award granted or to be granted to a Participant who is then subject to section 16 of the Exchange Act in respect of the Company, or relating to an Award intended by the Committee to qualify as "performance-based compensation" within the meaning of section 162(m) of the Code and regulations thereunder, may be taken either (i) by a subcommittee, designated by the Committee, composed solely of two or more Qualified Members, or (ii) by the Committee but with each such member who is not a Qualified Member abstaining or recusing himself or herself from such action; provided, however, that, upon such abstention or recusal, the Committee remains composed solely of two or more Qualified Members. Such action, authorized by such a subcommittee or by the Committee upon the abstention or recusal of such non-Qualified Member(s), shall be the action of the Committee for purposes of this Plan. Any action of the Committee shall be final, conclusive and binding on all persons, including the Company, its Subsidiaries, stockholders, Participants, Beneficiaries, and transferees under Subsection 10(b) hereof or other persons claiming rights from or through a Participant. The express grant of any specific power to the Committee, and the taking of any action by the Committee, shall not be construed as limiting any power or authority of the Committee. The Committee may delegate to officers or managers of the Company, its Parent or any Subsidiary, or committees thereof, the authority, subject to such terms as the Committee shall determine, to perform such functions, including administrative functions, as the Committee may determine, to the extent that such delegation will not result in the loss of an exemption under Rule 16b-3(d)(1) for Awards granted to Participants subject to section 16 of the Exchange Act in respect of the Company and will not cause Awards intended to qualify as "performance-based compensation" under section 162(m) of the Code to fail to so qualify.

(c) Limitation of Liability. The Committee and each member thereof shall be entitled to, in good faith, rely or act upon any report or other information furnished to him or her by any officer or employee of the Company, its Parent or a Subsidiary, the Company's legal counsel, independent auditors, consultants or any other agents assisting in the administration of this Plan. Members of the Committee and any officer or employee of the Company, its Parent or a Subsidiary acting at the direction or on behalf of the Committee shall not be personally liable for any action or determination taken or made in good faith with respect to this Plan, and shall, to the fullest extent permitted by law, be indemnified and held harmless by the Company with respect to any such action or determination.

4. Stock Subject to Plan.

(a) Overall Number of Shares Available for Delivery. Subject to adjustment in a manner consistent with any adjustment made pursuant to Section 9, the total number of shares of Stock reserved and available for issuance in connection with Awards under this Plan shall not exceed 5,000,000 shares.

(b) Application of Limitation to Grants of Awards. No Award may be granted if the number of shares of Stock to be delivered in connection with such Award exceeds the number of shares of Stock remaining available under this Plan minus the number of shares of Stock issuable in settlement of or relating to then-outstanding Awards. The Committee may adopt reasonable counting procedures to ensure appropriate counting, avoid double counting (as, for example, in the case of tandem or substitute awards) and make adjustments if the number of shares of Stock actually delivered differs from the number of shares previously counted in connection with an Award.

(c) Availability of Shares Not Issued under Awards. Shares of Stock subject to an Award under this Plan that expire or are canceled, forfeited, settled in cash or otherwise terminated without an issuance of shares to the Participant, including (i) the number of shares withheld in payment of any exercise or purchase price of an Award or taxes relating to Awards, and (ii) the number of shares surrendered in payment of any exercise or purchase price of an Award or taxes relating to any Award, will again be available for Awards under this Plan, except that if any such shares could not again be available for Awards to a particular Participant under any applicable law or regulation, such shares shall be available exclusively for Awards to Participants who are not subject to such limitation.

(d) Stock Offered. The shares to be delivered under the Plan shall be made available from (i) authorized but unissued shares of Stock, (ii) Stock held in the treasury of the Company, or (iii) previously issued shares of Stock reacquired by the Company, including shares purchased on the open market.

5. Eligibility; Per Person Award Limitations. Awards may be granted under this Plan only to Persons who are Eligible Persons at the time of grant thereof or in connection with the severance or retirement of Eligible Individuals; provided, however, Options may not be granted to Persons who are Eligible Persons because they are employees or service providers of Parent. In each calendar year, during any part of which this Plan is in effect, a Covered Employee may not be granted (a) Awards (other than Awards designated to be paid only in cash or the settlement of which is not based on a number of shares of Stock) relating to more than 2,000,000 shares of Stock, subject to adjustment in a manner consistent with any adjustment made pursuant to Section 9 and (b) Awards designated to be paid only in cash, or the settlement of which is not based on a number of shares of Stock, having a value determined on the date of grant in excess of $2,000,000.

6. Specific Terms of Awards.

(a) General. Awards may be granted on the terms and conditions set forth in this Section 6. In addition, the Committee may impose on any Award or the exercise thereof, at

the date of grant or thereafter (subject to Subsection 10(f)), such additional terms and conditions, not inconsistent with the provisions of this Plan, as the Committee shall determine, including terms requiring forfeiture of Awards in the event of termination of employment by the Participant, or termination of the Participant's service relationship with the Company, and terms permitting a Participant to make elections relating to his or her Award. The Committee shall retain full power and discretion to accelerate, waive or modify, at any time, any term or condition of an Award that is not mandatory under this Plan; provided, however, that the Committee shall not have any discretion to accelerate, waive or modify any term or condition of an Award that is intended to qualify as "performance-based compensation" for purposes of section 162(m) of the Code if such discretion would cause the Award to not so qualify.

(b) Options. The Committee is authorized to grant Options to Participants on the following terms and conditions:

(i) Exercise Price. Each Option agreement shall state the exercise price per share of Stock (the "***Exercise Price***"); provided, however, that the Exercise Price per share of Stock subject to an ISO shall not be less than the greater of (A) the par value per share of the Stock or (B) 100% of the Fair Market Value per share of the Stock as of the date of grant of the Option (or in the case of an individual who owns stock possessing more than 10 percent of the total combined voting power of all classes of stock of the Company or its parent or any subsidiary, 110% of the Fair Market Value per share of the Stock on

the date of grant). The exercise price per share of Stock subject to an Option other than an ISO shall not be less than the greater of (1) the par value per share of the Stock and (2) 100% of the Fair Market Value per share of the stock as of the date of grant of the Option.

(ii) Time and Method of Exercise. The Committee shall determine the time or times at which or the circumstances under which an Option may be exercised in whole or in part (including based on achievement of performance goals and/or future service requirements), the methods by which such exercise price may be paid or deemed to be paid, the form of such payment, including without limitation cash, Stock, other Awards or awards granted under other plans of the Company, its Parent or any Subsidiary, or other property (including notes or other contractual obligations of Participants to make payment on a deferred basis), and the methods by or forms in which Stock will be delivered or deemed to be delivered to Participants, including, but not limited to, the delivery of Restricted Stock subject to Subsection 6(d). In the case of an exercise whereby the Exercise Price is paid with Stock, such Stock shall be valued as of the date of exercise.

(iii) ISOs. The terms of any ISO granted under this Plan shall comply in all respects with the provisions of section 422 of the Code. Anything in this Plan to the contrary notwithstanding, no term of this Plan relating to ISOs (including any SAR in tandem therewith) shall be interpreted, amended or altered, nor shall any discretion or authority granted under this Plan be exercised, so as to disqualify either this Plan or any ISO under section 422 of the Code, unless the Participant has first requested the change that will result in such disqualification. ISOs shall not be granted more than ten years after the earlier of the adoption of this Plan or the approval of this Plan by the Company's stockholders. Notwithstanding the foregoing, the Fair Market Value of shares of Stock subject to an ISO and the aggregate Fair Market Value of shares of stock of any parent or subsidiary corporation (within the meaning of

sections 424(e) and (f) of the Code) subject to any other ISO (within the meaning of section 422 of the Code)) of the Company or a parent or subsidiary corporation (within the meaning of sections 424(e) and (f) of the Code) that first becomes purchasable by a Participant in any calendar year may not (with respect to that Participant) exceed $100,000, or such other amount as may be prescribed under section 422 of the Code or applicable regulations or rulings from time to time. As used in the previous sentence, Fair Market Value shall be determined as of the date the ISOs are granted. Failure to comply with this provision shall not impair the enforceability or exercisability of any Option, but shall cause the excess amount of shares to be reclassified in accordance with the Code.

(c) Stock Appreciation Rights. The Committee is authorized to grant SARs to Participants on the following terms and conditions:

(i) Right to Payment. An SAR shall confer on the Participant to whom it is granted a right to receive, upon exercise thereof, the excess of (A) the Fair Market Value of one share of Stock on the date of exercise over (B) the grant price of the SAR as determined by the Committee.

(ii) Rights Related to Options. An SAR granted in connection with an Option shall entitle a Participant, upon exercise, to surrender that Option or any portion thereof, to the extent unexercised, and to receive payment of an amount computed pursuant to Subsection 6(c)(ii)(B). That Option shall then cease to be exercisable to the extent surrendered. SARs granted in connection with an Option shall be subject to the terms of the Award agreement governing the Option, which shall comply with the following provisions in addition to those applicable to Options:

(A) An SAR granted in connection with an Option shall be exercisable only at such time or times and only to the extent that the related Option is exercisable.

(B) Upon the exercise of an SAR related to an Option, a Participant shall be entitled to receive payment from the Company of an amount determined by multiplying:

(1) the difference obtained by subtracting the exercise price of a share of Stock specified in the related Option from the Fair Market Value of a share of Stock on the date of exercise of the SAR, by

(2) the number of shares as to which that SAR has been exercised.

(iii) Right Without Option. An SAR granted independent of an Option shall be exercisable as determined by the Committee and set forth in the Award agreement governing the SAR, which Award agreement shall comply with the following provisions:

(A) Each Award agreement shall state the total number of shares of Stock to which the SAR relates.

(B) Each Award agreement shall state the time or periods in which the right to exercise the SAR or a portion thereof shall vest and the number of shares of Stock for which the right to exercise the SAR shall vest at each such time or period.

(C) Each Award agreement shall state the date at which the SARs shall expire if not previously exercised.

(D) Each SAR shall entitle a participant, upon exercise thereof, to receive payment of an amount determined by multiplying:

(1) the difference obtained by subtracting the Fair Market Value of a share of Stock on the date of grant of the SAR from the Fair Market Value of a share of Stock on the date of exercise of that SAR, by

(2) he number of shares as to which the SAR has been exercised.

(iv) Terms. Except as otherwise provided herein, the Committee shall determine at the date of grant or thereafter, the time or times at which and the circumstances under which an SAR may be exercised in whole or in part (including based on achievement of performance goals and/or future service requirements), the method of exercise, method of settlement, form of consideration payable in settlement, method by or forms in which Stock will be delivered or deemed to be delivered to Participants, whether or not an SAR shall be in tandem or in combination with any other Award, and any other terms and conditions of any SAR. SARs may be either freestanding or in tandem with other Awards.

(d) Restricted Stock. The Committee is authorized to grant Restricted Stock to Participants on the following terms and conditions:

(i) Grant and Restrictions. Restricted Stock shall be subject to such restrictions on transferability, risk of forfeiture and other restrictions, if any, as the Committee may impose, which restrictions may lapse separately or in combination at such times, under such circumstances (including based on achievement of performance goals and/or future service requirements), in such installments or otherwise, as the Committee may determine at the date of grant or thereafter. During the restricted period applicable to the Restricted Stock, the Restricted Stock may not be sold, transferred, pledged, hypothecated, margined or otherwise encumbered by the Participant.

(ii) Certificates for Stock. Restricted Stock granted under this Plan may be evidenced in such manner as the Committee shall determine. If certificates representing Restricted Stock are registered in the name of the Participant, the Committee may require that such certificates bear an appropriate legend referring to the terms, conditions and restrictions applicable to such Restricted Stock, that the Company retain physical possession of the certificates, and that the Participant deliver a stock power to the Company, endorsed in blank, relating to the Restricted Stock.

(iii) Dividends and Splits. As a condition to the grant of an Award of Restricted Stock, the Committee may require or permit a Participant to elect that any cash dividends paid on a share of Restricted Stock be automatically reinvested in additional shares of Restricted Stock or applied to the purchase of additional Awards under this Plan. Unless otherwise determined by the Committee, Stock distributed in connection with a Stock split or Stock dividend, and other property distributed as a dividend, shall be subject to restrictions and a risk of forfeiture to the same extent as the Restricted Stock with respect to which such Stock or other property has been distributed.

(e) Restricted Stock Units. The Committee is authorized to grant Restricted Stock Units to Participants, which are rights to receive Stock or cash, as determined by the Committee, at the end of a specified deferral period, subject to the following terms and conditions:

(i) Award and Restrictions. Settlement of an Award of Restricted Stock Units shall occur upon expiration of the deferral period specified for such Restricted Stock Unit by the Committee (or, if permitted by the Committee, as elected by the Participant). In addition, Restricted Stock Units shall be subject to such restrictions (which may include a risk of forfeiture) as the Committee may impose, if any, which restrictions may lapse at the expiration of the deferral period or at earlier specified times (including based on achievement of performance goals and/or future service requirements), separately or in combination, in installments or otherwise, as the Committee may determine. Restricted Stock Units shall be satisfied by the delivery of cash or Stock in the amount equal to the Fair Market Value of the specified number of shares of Stock covered by the Restricted Stock Units, or a combination thereof, as determined by the Committee at the date of grant or thereafter.

(ii) Dividend Equivalents. Unless otherwise determined by the Committee at date of grant, Dividend Equivalents on the specified number of shares of Stock covered by an Award of Restricted Stock Units shall be either (A) paid with respect to such Restricted Stock Units on the dividend payment date in cash or in shares of unrestricted Stock having a Fair Market Value equal to the amount of such dividends, or (B) deferred with respect to such Restricted Stock Units and the amount or value thereof automatically deemed reinvested in additional Restricted Stock Units, other Awards or other investment vehicles, as the Committee shall determine or permit the Participant to elect.

(f) Bonus Stock and Awards in Lieu of Obligations. The Committee is authorized to grant Stock as a bonus, or to grant Stock or other Awards in lieu of obligations to pay cash or deliver other property under this Plan or under other plans or compensatory arrangements, provided that, in the case of Participants subject to section 16 of the Exchange Act, the amount of such grants remains within the discretion of the Committee to the extent necessary to ensure that acquisitions of Stock or other Awards are exempt from liability under section 16(b) of the Exchange Act. Stock or Awards granted hereunder shall be subject to such other terms as shall be determined by the Committee. In the case of any grant of Stock to an officer of the Company, its Parent or a Subsidiary in lieu of salary or other cash compensation, the number of shares granted in place of such compensation shall be reasonable, as determined by the Committee.

(g) Dividend Equivalents. The Committee is authorized to grant Dividend Equivalents to a Participant, entitling the Participant to receive cash, Stock, other Awards, or other property equal in value to dividends paid with respect to a specified number of shares of Stock, or other periodic payments. Dividend Equivalents may be awarded on a free-standing basis or in connection with another Award. The Committee may provide that Dividend Equivalents shall be paid or distributed when accrued or shall be deemed to have been reinvested in additional Stock, Awards, or other investment vehicles, and subject to such restrictions on transferability and risks of forfeiture, as the Committee may specify.

(h) Other Stock-Based Awards. The Committee is authorized, subject to limitations under applicable law, to grant to Participants such other Awards that may be denominated or payable in, valued in whole or in part by reference to, or otherwise based on, or related to, Stock, as deemed by the Committee to be consistent with the purposes of this Plan, including without limitation convertible or exchangeable debt securities, other rights convertible or exchangeable into Stock, purchase rights for Stock, Awards with value and payment contingent upon performance of the Company or any other factors designated by the Committee, and Awards valued by reference to the book value of Stock or the value of securities of or the performance of specified Subsidiaries. The Committee shall determine the terms and conditions of such Awards. Stock delivered pursuant to an Award in the nature of a purchase right granted under this Subsection 6(h) shall be purchased for such consideration, paid for at such times, by such methods, and in such forms, including, without limitation, cash, Stock, other Awards, or other property, as the Committee shall determine. Cash awards, as an element of or supplement to any other Award under this Plan, may also be granted pursuant to this Subsection 6(h).

7. Certain Provisions Applicable to Awards.

(a) Termination of Employment. Except as provided herein, the treatment of an Award upon a termination of employment or any other service relationship by and between a Participant and the Company, its Parent or any Subsidiary shall be specified in the agreement controlling such Award.

(b) Stand-Alone, Additional, Tandem, and Substitute Awards. Awards granted under this Plan may, in the discretion of the Committee, be granted either alone or in addition to, in tandem with, or in substitution or exchange for, any other Award or any award granted under another plan of the Company, its Parent, any Subsidiary, or any business entity to be acquired by the Company, its Parent or a Subsidiary, or any other right of a Participant to receive payment from the Company, its Parent or any Subsidiary. Such additional, tandem and substitute or exchange Awards may be granted at any time. If an Award is granted in substitution or exchange for another Award, the Committee shall require the surrender of such other Award in consideration for the grant of the new Award. In addition, Awards may be granted in lieu of cash compensation, including in lieu of cash amounts payable under other plans of the Company, its Parent or any Subsidiary, in which the value of Stock subject to the Award is equivalent in value to the cash compensation, or in which the exercise price, grant price or purchase

price of the Award in the nature of a right that may be exercised is equal to the Fair Market Value of the underlying Stock minus the value of the cash compensation surrendered.

(c) Term of Awards. Except as specified herein, the term of each Award shall be for such period as may be determined by the Committee; provided, however, that in no event shall the term of any Option or SAR exceed a period of ten years (or such shorter term as may be required in respect of an ISO under section 422 of the Code).

(d) Form and Timing of Payment under Awards; Deferrals. Subject to the terms of this Plan and any applicable Award agreement, payments to be made by the Company or a Subsidiary upon the exercise of an Option or other Award or settlement of an Award may be made in such forms as the Committee shall determine, including without limitation cash, Stock, other Awards or other property, and may be made in a single payment or transfer, in installments, or on a deferred basis. Except as otherwise provided herein, the settlement of any Award may be accelerated, and cash paid in lieu of Stock in connection with such settlement, in the discretion of the Committee or upon occurrence of one or more specified events (in addition to a Change in Control). Installment or deferred payments may be required by the Committee (subject to Subsection 10(f) of this Plan, including the consent provisions thereof in the case of any deferral of an outstanding Award not provided for in the original Award agreement) or permitted at the election of the Participant on terms and conditions established by the Committee. Payments may include, without limitation, provisions for the payment or crediting of reasonable interest on installment or deferred payments or the grant or crediting of Dividend Equivalents or other amounts in respect of installment or deferred payments denominated in Stock. Any deferral shall only be allowed as is provided in a separate deferred compensation plan adopted by the Company. This Plan shall not constitute an "employee benefit plan" for purposes of section 3(3) of the Employee Retirement Income Security Act of 1974, as amended.

(e) Forfeiture for Detrimental Activity. Notwithstanding any provision of this Plan to the contrary, if at any time prior to the third anniversary of the most recent termination of an employee's Service with the Company, its Parent or any Subsidiary of the Company, the Committee in its discretion determines that such employee, at any time during his or her most recent Service with the Company, its Parent or any Subsidiary of the Company, or within the three-year period after termination of such Service, engaged in any Detrimental Activity, such employee shall (i) immediately forfeit the right to exercise any and all Options granted to him or her under the Plan, irrespective of whether the Option Shares constitute Vested Shares, and (ii) upon demand by the Committee, promptly return to the Company any or all shares of Stock acquired pursuant to Awards granted to employee under the Plan and all associated dividends. The purchase price per share of Stock returned to the Company under this Section 7(e) will be an amount equal to employee's purchase price per share as reflected in each such Award (the "***Repurchase Price***"), as adjusted pursuant to Section 9. The Company will pay the aggregate Repurchase Price to the employee in cash within 30 days after the date of the written notice to the employee of the Company's exercise of its rights under this Section 7(e). For purposes of the foregoing, cancellation of any indebtedness of the employee to the Company associated with the purchase of the shares will be treated as payment to the employee in cash to the extent of the unpaid principal and any accrued interest canceled. The shares being repurchased will be delivered to the Company by the employee at the same time as the delivery of the Repurchase Price to the employee. If the Committee suspects prior to the third anniversary of the most recent termination of the employee's Service with the Company, its Parent or any Subsidiary of the Company, that the employee has engaged in any Detrimental Activity at any time during his or her most recent Service with the Company, its Parent or any Subsidiary of the Company or

within the three year period after termination of such Service, the exercisability of the employee's Options shall be suspended for as long as the Committee deems necessary (but not to extend past such third anniversary) to permit the investigation and final determination of the veracity of such allegation.

(f) Exemptions from Section 16(b) Liability. It is the intent of the Company that the grant of any Awards to or other transaction by a Participant who is subject to section 16 of the Exchange Act shall be exempt from such section pursuant to an applicable exemption (except for transactions acknowledged in writing to be non-exempt by such Participant). Accordingly, if any provision of this Plan or any Award agreement does not comply with the requirements of Rule 16b-3 as then applicable to any such transaction, such provision shall be construed or deemed amended to the extent necessary to conform to the applicable requirements of Rule 16b-3 so that such Participant shall avoid liability under section 16(b) of the Exchange Act.

(g) Non-Competition Agreement. Each Participant to whom an Award is granted under this Plan may be required to agree in writing as a condition to the granting of such Award not to engage in conduct in competition with the Company, its Parent or any of its Subsidiaries for a period after the termination of such Participant's employment with the Company and its Parent and Subsidiaries as determined by the Committee.

8. Performance and Annual Incentive Awards.

(a) Performance Conditions. The right of a Participant to exercise or receive a grant or settlement of any Award, and the timing thereof, may be subject to such performance conditions as may be specified by the Committee. The Committee may use such business criteria and other measures of performance as it may deem appropriate in establishing any performance conditions, and may exercise its discretion to reduce or increase the amounts payable under any Award subject to performance conditions, except as limited under Subsections 8(b) and 8(c) hereof in the case of a Performance Award or Annual Incentive Award intended to qualify under section 162(m) of the Code.

(b) Performance Awards Granted to Designated Covered Employees. If the Committee determines that a Performance Award to be granted to an Eligible Person who is designated by the Committee as likely to be a Covered Employee should qualify as "performance-based compensation" for purposes of section 162(m) of the Code, the grant, exercise and/or settlement of such Performance Award may be contingent upon achievement of preestablished performance goals and other terms set forth in this Subsection 8(b).

(i) Performance Goals Generally. The performance goals for such Performance Awards shall consist of one or more business criteria or individual performance criteria and a targeted level or levels of performance with respect to each of such criteria, as specified by the Committee consistent with this Subsection 8(b). Performance goals shall be objective and shall otherwise meet the requirements of section 162(m) of the Code and regulations thereunder (including Treasury Regulation §1.162-27 and successor regulations thereto), including the requirement that the level or levels of performance targeted by the Committee result in the achievement of performance goals being "substantially uncertain." The

Committee may determine that such Performance Awards shall be granted, exercised, and/or settled upon achievement of any one performance goal or that two or more of the performance goals must be achieved as a condition to grant, exercise and/or settlement of such Performance Awards. Performance goals may differ for Performance Awards granted to any one Participant or to different Participants.

(ii) Business and Individual Performance Criteria

(A) Business Criteria. One or more of the following business criteria for the Company, on a consolidated basis, and/or for specified Subsidiaries or business or geographical units of the Company (except with respect to the total stockholder return criteria), shall be used by the Committee in establishing performance goals for such Performance Awards: (1) earnings per share; (2) revenues, (3) increase in revenues; (4) increase in cash flow; (5) increase in cash flow return; (6) return on net assets; (7) return on assets; (8) return on investment; (9) return on capital; (10) return on equity; (11) economic value added; (12) operating margin; (13) contribution margin; (14) net income before taxes; (15) net income after taxes; (16) pretax earnings; (17) pretax earnings before interest, depreciation and amortization; (18) pretax operating earnings after interest expense and before incentives, service fees, and extraordinary or special items; (19) total stockholder return; (20) debt reduction; (21) market share; (22) change in the Fair Market Value of the Stock; and (23) any of the above goals determined on an absolute or relative basis or as compared to the performance of a published or special index deemed applicable by the Committee including, but not limited to, the Standard & Poor's 500 Stock Index or a group of comparable companies. One or more of the foregoing business criteria shall also be exclusively used in establishing performance goals for Annual Incentive Awards granted to a Covered Employee under Subsection 8(c) hereof.

(B) Individual Performance Criteria. The grant, exercise and/or settlement of Performance Awards may also be contingent upon individual performance goals established by the Committee. If required for compliance with section 162(m) of the Code, such criteria shall be approved by the stockholders of the Company.

(iii) Performance Period; Timing for Establishing Performance Goals. Achievement of performance goals in respect of such Performance Awards shall be measured over a performance period of up to ten years, as specified by the Committee. Performance goals shall be established not later than 90 days after the beginning of any performance period applicable to such Performance Awards, or at such other date as may be required or permitted for "performance-based compensation" under section 162(m) of the Code.

(iv) Performance Award Pool. The Committee may establish a Performance Award pool, which shall be an unfunded pool, for purposes of measuring performance of the Company in connection with Performance Awards. The amount of such Performance Award pool shall be based upon the achievement of a performance goal or goals based on one or more of the criteria set forth in Subsection 8(b)(ii) hereof during the given performance period, as specified by the Committee in accordance with Subsection 8(b)(iii) hereof. The Committee may specify the amount of the Performance Award pool as a percentage of any of such criteria, a percentage thereof in excess of a threshold amount, or as another amount which need not bear a strictly mathematical relationship to such criteria.

(v) Settlement of Performance Awards; Other Terms. After the end of each performance period, the Committee shall determine the amount, if any, of (A) the Performance Award pool, and the maximum amount of the potential Performance Award payable to each Participant in the Performance Award pool, or (B) the amount of the potential Performance Award otherwise payable to each Participant. Settlement of such Performance Awards shall be in cash, Stock, other Awards or other property, in the discretion of the Committee. The Committee may, in its discretion, reduce the amount of a settlement otherwise to be made in connection with such Performance Awards, but may not exercise discretion to increase any such amount payable to a Covered Employee in respect of a Performance Award subject to this Subsection 8(b). The Committee shall specify the circumstances in which such Performance Awards shall be paid or forfeited in the event of termination of employment by the Participant prior to the end of a performance period or settlement of Performance Awards.

(c) Annual Incentive Awards Granted to Designated Covered Employees. If the Committee determines that an Annual Incentive Award to be granted to an Eligible Person who is designated by the Committee as likely to be a Covered Employee should qualify as "performance-based compensation" for purposes of section 162(m) of the Code, the grant, exercise and/or settlement of such Annual Incentive Award shall be contingent upon achievement of preestablished performance goals and other terms set forth in this Subsection 8(c).

(i) Potential Annual Incentive Awards. Not later than the end of the 90th day of each applicable year, or at such other date as may be required or permitted in the case of Awards intended to be "performance-based compensation" under section 162(m) of the Code, the Committee shall determine the Eligible Persons who will potentially receive Annual Incentive Awards, and the amounts potentially payable thereunder, for that fiscal year, either out of an Annual Incentive Award pool established by such date under Subsection 8(c)(i) hereof or as individual Annual Incentive Awards. The amount potentially payable, with respect to Annual Incentive Awards, shall be based upon the achievement of a performance goal or goals based on one or more of the business criteria set forth in Subsection 8(b)(ii) hereof in the given performance year, as specified by the Committee.

(ii) Annual Incentive Award Pool. The Committee may establish an Annual Incentive Award pool, which shall be an unfunded pool, for purposes of measuring performance of the Company in connection with Annual Incentive Awards. The amount of such Annual Incentive Award pool shall be based upon the achievement of a performance goal or goals based on one or more of the business criteria set forth in Subsection 8(b)(ii) hereof during the given performance period, as specified by the Committee in accordance with Subsection 8(b)(iii) hereof. The Committee may specify the amount of the Annual Incentive Award pool as a percentage of any of such business criteria, a percentage thereof in excess of a threshold amount, or as another amount which need not bear a strictly mathematical relationship to such business criteria.

(iii) Payout of Annual Incentive Awards. After the end of each applicable year, the Committee shall determine the amount, if any, of (A) the Annual Incentive Award pool, and the maximum amount of the potential Annual Incentive Award payable to each Participant in the Annual Incentive Award pool, or (B) the amount of the potential Annual

Incentive Award otherwise payable to each Participant. The Committee may, in its discretion, determine that the amount payable to any Participant as a final Annual Incentive Award shall be reduced from the amount of his or her potential Annual Incentive Award, including a determination to make no final Award whatsoever, but may not exercise discretion to increase any such amount in the case of an Annual Incentive Award intended to qualify under section 162(m) of the

Code. The Committee shall specify the circumstances in which an Annual Incentive Award shall be paid or forfeited in the event of termination of employment by the Participant prior to the end of the applicable year or settlement of such Annual Incentive Award.

(d) Written Determinations. All determinations by the Committee as to the establishment of performance goals, the amount of any Performance Award pool or potential individual Performance Awards, the achievement of performance goals relating to Performance Awards under Subsection 8(b), the amount of any Annual Incentive Award pool or potential individual Annual Incentive Awards, the achievement of performance goals relating to Annual Incentive Awards under Subsection 8(c) shall be made in writing in the case of any Award intended to qualify under section 162(m) of the Code. The Committee may not delegate any responsibility relating to such Performance Awards or Annual Incentive Awards.

(e) Status of Subsection 8(b) and Subsection 8(c) Awards under Section 162(m) of the Code. It is the intent of the Company that Performance Awards and Annual Incentive Awards under Subsections 8(b) and 8(c) hereof granted to persons who are designated by the Committee as likely to be Covered Employees within the meaning of section 162(m) of the Code and regulations thereunder (including Treasury Regulation §1.162-27 and successor regulations thereto) shall, if so designated by the Committee, constitute "performance-based compensation" within the meaning of section 162(m) of the Code and regulations thereunder. Accordingly, the terms of Subsections 8(b), (c), (d) and (e), including the definitions of Covered Employee and other terms used therein, shall be interpreted in a manner consistent with section 162(m) of the Code and regulations thereunder. The foregoing notwithstanding, because the Committee cannot determine with certainty whether a given Participant will be a Covered Employee with respect to a fiscal year that has not yet been completed, the term Covered Employee as used herein shall mean only a person designated by the Committee, at the time of grant of Performance Awards or an Annual Incentive Award, who is likely to be a Covered Employee with respect to that fiscal year. If any provision of this Plan as in effect on the date of adoption or any agreements relating to Performance Awards or Annual Incentive Awards that are designated as intended to comply with section 162(m) of the Code does not comply or is inconsistent with the requirements of section 162(m) of the Code or regulations thereunder, such provision shall be construed or deemed amended to the extent necessary to conform to such requirements.

9. Subdivision or Consolidation; Recapitalization; Change in Control; Reorganization.

(a) Existence of Plans and Awards. The existence of this Plan and the Awards granted hereunder shall not affect in any way the right or power of the Board or the stockholders of the Company to make or authorize any adjustment, recapitalization, reorganization or other change in the Company's capital structure or its business, any merger or consolidation of the Company, any issue of debt or equity securities ahead of or affecting Stock

or the rights thereof, the dissolution or liquidation of the Company or any sale, lease, exchange or other disposition of all or any part of its assets or business or any other corporate act or proceeding.

(b) Subdivision or Consolidation of Shares. The terms of an Award and the number of shares of Stock authorized pursuant to Section 4 for issuance under the Plan shall be subject to adjustment from time to time, in accordance with the following provisions:

(i) If at any time, or from time to time, the Company shall subdivide as a whole (by a Stock split, by the issuance of a distribution on Stock payable in Stock, or otherwise) the number of shares of Stock then outstanding into a greater number of shares of Stock, then (A) the maximum number of shares of Stock available in connection with the Plan or Awards as provided in Sections 4 and 5 shall be increased proportionately, and the kind of shares or other securities available for the Plan shall be appropriately adjusted, (B) the number of shares of Stock (or other kind of shares or securities) that may be acquired under any Award shall be increased proportionately, and (C) the price (including the exercise price) for each share of Stock (or other kind of shares or securities) subject to then outstanding Awards shall be reduced proportionately, without changing the aggregate purchase price or value as to which outstanding Awards remain exercisable or subject to restrictions.

(ii) If at any time, or from time to time, the Company shall consolidate as a whole (by reverse Stock split, or otherwise) the number of shares of Stock then outstanding into a lesser number of shares of Stock, (A) the maximum number of shares of Stock available in connection with the Plan or Awards as provided in Sections 4 and 5 shall be decreased proportionately, and the kind of shares or other securities available for the Plan shall be appropriately adjusted, (B) the number of shares of Stock (or other kind of shares or securities) that may be acquired under any Award shall be decreased proportionately, and (C) the price (including the exercise price) for each share of Stock (or other kind of shares or securities) subject to then outstanding Awards shall be increased proportionately, without changing the aggregate purchase price or value as to which outstanding Awards remain exercisable or subject to restrictions.

(iii) Whenever the number of shares of Stock subject to outstanding Awards and the price for each share of Stock subject to outstanding Awards are required to be adjusted as provided in this Subsection 9(b), the Committee shall promptly prepare, and deliver to each Participant, a notice setting forth, in reasonable detail, the event requiring adjustment, the amount of the adjustment, the method by which such adjustment was calculated, and the change in price and the number of shares of Stock, other securities, cash, or property purchasable subject to each Award after giving effect to the adjustments.

(iv) Adjustments under Subsections 9(b)(i) and (ii) shall be made by the Committee, and its determination as to what adjustments shall be made and the extent thereof shall be final, binding, and conclusive. No fractional interest shall be issued under the Plan on account of any such adjustments.

(c) Corporate Recapitalization.

(i) If the Company recapitalizes, reclassifies its capital stock, or otherwise changes its capital structure (a "***recapitalization***"), the number and class of shares of Stock covered by an Option or an SAR theretofore granted shall be adjusted so that such Option or SAR shall thereafter cover the number and class of shares of stock and securities to which the holder would have been entitled pursuant to the terms of the recapitalization if, immediately prior to the recapitalization, the holder had been the holder of record of the number of shares of Stock then covered by such Option or SAR and the share limitations provided in Sections 4 and 5 shall be adjusted in a manner consistent with the recapitalization.

(ii) In the event of changes in the outstanding Stock by reason of recapitalization, reorganizations, mergers, consolidations, combinations, exchanges or other relevant changes in capitalization occurring after the date of the grant of any Award and not otherwise provided for by this Section 9, any outstanding Awards and any agreements evidencing such Awards shall be subject to adjustment by the Committee at its discretion as to the number

and price of shares of Stock or other consideration subject to such Awards. In the event of any such change in the outstanding Stock, the share limitations provided in Sections 4 and 5 may be appropriately adjusted by the Committee, whose determination shall be conclusive.

(d) Additional Issuances. Except as hereinbefore expressly provided, the issuance by the Company of shares of stock of any class or securities convertible into shares of stock of any class, for cash, property, labor or services, upon direct sale, upon the exercise of rights or warrants to subscribe therefor, or upon conversion of shares or obligations of the Company convertible into such shares or other securities, and in any case whether or not for fair value, shall not affect, and no adjustment by reason thereof shall be made with respect to, the number of shares of Stock subject to Awards theretofore granted or the purchase price per share, if applicable.

(e) Change in Control. Upon a Change in Control the Committee, acting in its sole discretion without the consent or approval of any holder, shall affect one or more of the following alternatives, which may vary among individual holders and which may vary among Options or SARs (collectively "***Grants***") held by any individual holder: (i) accelerate the time at which Grants then outstanding may be exercised so that such Grants may be exercised in full for a limited period of time on or before a specified date (before or after such Change in Control) fixed by the Committee, after which specified date all unexercised Grants and all rights of holders thereunder shall terminate, (ii) require the mandatory surrender to the Company by selected holders of some or all of the outstanding Grants held by such holders (irrespective of whether such Grants are then exercisable under the provisions of this Plan) as of a date, before or after such Change in Control, specified by the Committee, in which event the Committee shall thereupon cancel such Grants and pay to each holder an amount of cash per share equal to the excess, if any, of the amount calculated in Subsection 9(f) (the "***Change in Control Price***") of the shares subject to such Grants over the exercise price(s) under such Grants for such shares, or (iii) make such adjustments to Grants then outstanding as the Committee deems appropriate to reflect such Change in Control; provided, however, that the Committee may determine in its sole discretion that no adjustment is necessary to Grants then outstanding; provided, further, however, that the right to make such adjustments shall include, but not be limited to, the modification of

Grants such that the holder of the Grant shall be entitled to purchase or receive (in lieu of the total shares or other consideration that the holder would otherwise be entitled to purchase or receive under the Grant (the "***Total Consideration***")), the number of shares of stock, other securities, cash or property to which the Total Consideration would have been entitled to in connection with the Change in Control (A) (in the case of Options), at an aggregate exercise price equal to the exercise price that would have been payable if the total shares had been purchased upon the exercise of the Grant immediately before the consummation of the Change in Control and (B) (in the case of SARs) if the SARs had been exercised immediately before the consummation of the Change in Control.

(f) Change in Control Price. The "***Change in Control Price***" shall equal the amount determined in clause (i), (ii), (iii), (iv) or (v), whichever is applicable, as follows: (i) the per share price offered to holders of Stock in any merger or consolidation, (ii) the per share value of the Stock immediately before the Change in Control without regard to assets sold in the Change in Control and assuming the Company has received the consideration paid for the assets in the case of a sale of the assets, (iii) the amount distributed per share of Stock in a dissolution transaction, (iv) the price per share offered to holders of Stock in any tender offer or exchange offer whereby a Change in Control takes place, or (v) if such Change in Control occurs other than pursuant to a transaction described in clauses (i), (ii), (iii), or (iv) of this Subsection 9(f), the Fair Market Value per share of the shares that may otherwise be obtained with respect to such Grants or to which such Grants track, as determined by the Committee as of the date determined by the Committee to be the date of cancellation and surrender of such Grants. In the event that the consideration offered to stockholders of the Company in any transaction described in this Subsection 9(f) or Subsection 9(e) consists of anything other than cash, the Committee shall determine the fair cash equivalent of the portion of the consideration offered which is other than cash.

10. General Provisions.

(a) Restricted Securities. Prior to a Qualifying Public Offering, the Stock to be issued under this Plan, which may be issued in reliance on the exemption from registration set forth in Rule 701 or another exemption to registration under the Securities Act, shall be deemed to be "restricted securities" as defined in Rule 144, promulgated by the Securities and Exchange Commission under the Securities Act as from time to time in effect and applicable to the Plan and Participants. Resales of such Stock by the holder thereof shall be in compliance with the Securities Act or an exemption therefrom. Such Stock may bear a legend if determined necessary by the Committee in substantially the following form:

"THE SHARES OF STOCK REPRESENTED BY THIS CERTIFICATE HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, OR ANY STATE SECURITIES LAWS. THE SHARES MAY NOT BE OFFERED FOR SALE, SOLD, PLEDGED, TRANSFERRED, OR OTHERWISE DISPOSED OF UNTIL THE HOLDER HEREOF PROVIDES EVIDENCE SATISFACTORY TO MIRNA THERAPEUTICS, INC. (WHICH, IN THE DISCRETION OF MIRNA THERAPEUTICS, INC., MAY INCLUDE AN OPINION OF COUNSEL SATISFACTORY TO MIRNA THERAPEUTICS, INC.) THAT SUCH OFFER, SALE, PLEDGE, TRANSFER, OR OTHER

DISPOSITION WILL NOT VIOLATE APPLICABLE FEDERAL OR STATE LAWS."

(b) Transferability.

(i) Permitted Transferees. The Committee may, in its discretion, permit a Participant to transfer all or any portion of an Option, or authorize all or a portion of an Option to be granted to an Eligible Person to be on terms which permit transfer by such Participant; provided that, in either case the transferee or transferees must be any child, stepchild, grandchild, parent, stepparent, grandparent, spouse, former spouse, sibling, niece, nephew, mother-in-law, father-in-law, son-in-law, daughter-in-law, brother-in-law, or sister-in-law, including adoptive relationships, in each case with respect to the Participant, any person sharing the Participant's household (other than a tenant or employee of the Company), a trust in which these persons have more than fifty percent of the beneficial interest, a foundation in which these persons (or the Participant) control the management of assets, or any other entity in which these persons (or the Participant) own more than fifty percent of the voting interests (collectively, "***Permitted Transferees***"); provided further that, (X) there may be no consideration for any such transfer and (Y) subsequent transfers of Options transferred as provided above shall be prohibited except subsequent transfers back to the original holder of the Option and transfers to other Permitted Transferees of the original holder. Agreements evidencing Options with respect to which such transferability is authorized at the time of grant must be approved by the Committee, and must expressly provide for transferability in a manner consistent with this Subsection 10(b)(i).

(ii) Qualified Domestic Relations Orders. An Option, Stock Appreciation Right, Restricted Stock Unit Award, Restricted Stock Award or other Award may be transferred, to a Permitted Transferee, pursuant to a domestic relations order entered or approved by a court of competent jurisdiction upon delivery to the Company of written notice of such transfer and a certified copy of such order.

(iii) Other Transfers. Except as expressly permitted by Subsections 10(b)(i) and 10(b)(ii), Awards shall not be transferable other than by will or the laws of descent and distribution. Notwithstanding anything to the contrary in this Section 10, an Incentive Stock Option shall not be transferable other than by will or the laws of descent and distribution.

(iv) Effect of Transfer. Following the transfer of any Award as contemplated by Subsections 10(b)(i), 10(b)(ii) and 10(b)(iii), (A) such Award shall continue to be subject to the same terms and conditions as were applicable immediately prior to transfer, provided that the term "***Participant***" shall be deemed to refer to the Permitted Transferee, the recipient under a qualified domestic relations order, or the estate or heirs of a deceased Participant, as applicable, to the extent appropriate to enable the Participant to exercise the transferred Award in accordance with the terms of this Plan and applicable law and (B) the provisions of the Award relating to exercisability shall continue to be applied with respect to the original Participant and, following the occurrence of any applicable events described therein the Awards shall be exercisable by the Permitted Transferee, the recipient under a qualified domestic

relations order, or the estate or heirs of a deceased Participant, as applicable, only to the extent and for the periods that would have been applicable in the absence of the transfer.

(v) Procedures and Restrictions. Any Participant desiring to transfer an Award as permitted under Subsections 10(b)(i), 10(b)(ii) or 10(b)(iii) shall make application therefor in the manner and time specified by the Committee and shall comply with such other requirements as the Committee may require to assure compliance with all applicable securities laws. The Committee shall not give permission for such a transfer if (A) it would give rise to short swing liability under section 16(b) of the Exchange Act or (B) it may not be made in compliance with all applicable federal, state and foreign securities laws.

(vi) Registration. To the extent the issuance to any Permitted Transferee of any shares of Stock issuable pursuant to Awards transferred as permitted in this Subsection 10(b) is not registered pursuant to the effective registration statement of the Company generally covering the shares to be issued pursuant to this Plan to initial holders of Awards, the Company shall not have any obligation to register the issuance of any such shares of Stock to any such transferee.

(c) Right of First Refusal. If any Participant ("***Transferor***"), regardless of whether such Participant is the original holder of the Award contemplated in this Subsection 10(c), proposes to sell, transfer, assign, hypothecate, make gifts of or in any manner dispose of, encumber, or alienate (each individually constituting a "***Transfer***") to a transferee, any Stock, obtained in connection with any Award held by such Transferor, either pursuant to a bona fide offer ("***Offer***") from a potential transferee ("***Offeror***") or by effecting a gift of the Stock ("***Gift***") to a donee ("***Donee***") without consideration, then the Transferor must comply with the provisions of this Subsection 10(c), including, without limitation, acknowledging and allowing the applicable time periods to lapse with respect to the rights of the Company as provided herein, before accepting any such Offer or otherwise affecting the Transfer of any Stock pursuant to such Offer, or affecting any such Gift.

(i) Statement of Offer. Before accepting any Offer or affecting any Gift, the Transferor shall obtain from the Offeror or Donee, as the case may be, a statement ("***Statement***") in writing addressed to the Transferor and signed by the Offeror or Donee, setting forth: (i) the date of the Statement (the "***Statement Date***"); (ii) the number of shares of Stock covered by the Offer or Gift and, in the case of an Offer, the price per share to be paid by the Offeror and the terms of payment of such price; (iii) the Offeror's or Donee's willingness to be bound by the terms of this Subsection 10(c) and execute and deliver to the Company such documentation as required under this Subsection 10(c); (iv) the Offeror's or Donee's name, address and telephone number; and (v) the Offeror's or Donee's willingness to supply any additional information about himself or herself as may be reasonably requested by the Company. Promptly upon receipt of a Statement, and before accepting the Offer or affecting the Gift to which the Statement relates, the Transferor shall deliver to the Company (1) a copy of the Statement, and (2) in the case of an Offer, evidence reasonably satisfactory to the Company as to the Offeror's financial ability to consummate the proposed purchase.

(ii) Company Rights. Subject to the provisions of Subsection 10(c)(i), upon receipt of a copy of the Statement, the Company shall have the exclusive right and option

(the "***Right***"), but not the obligation, to purchase all of the shares of Stock that the Offeror proposes to purchase from the Transferor or, in the case of a Gift, that the Transferor proposes to give to the Donee (collectively, "***Subject Securities***") (A) in the case of an Offer, for the per share price and on the terms as set forth in the Statement; provided, however, that if the purchase price is payable in whole or in part in property (which term shall include the securities of any issuer other than the Company) other than cash, the Company may pay, in lieu of such property, a sum of cash equal to the fair market value of such property as determined by the Transferor and the Company in good faith or, if the Transferor and the Company do not agree on the fair market value of such property within five days after the Company delivers written notice (as described below) of its intention to exercise the Right, then the Transferor and the Company shall select one independent appraiser (with each of the Transferor and the Company jointly bearing one-half of the expense of the appraiser) to determine the fair market value of that property and the appraised fair market value of that property as determined by such appraiser shall be deemed the fair market value of that property for purposes of this Subsection 10(c)(ii), or (B) in the case of a Gift, the Fair Market Value of the Subject Securities, as determined in good faith by the Company; provided that the Transferor may elect to retain the Subject Securities rather than sell the Subject Securities at the Fair Market Value as determined by the Company by giving written notice thereof to the Company within five days after such determination by the Company is received in writing by the Transferor. The Company shall exercise the Right by giving written notice thereof to the Transferor. Upon exercising the Right, the Company shall have the obligation, to the extent it lawfully may do so, to purchase the Subject Securities within 30 days after the date of the Company's receipt of its copy of the Statement on and subject to the terms and conditions hereof. If the terms of the purchase include the Transferor's release of any pledge or encumbrance on the Subject Securities and the Transferor shall have failed to obtain the release of the pledge or encumbrance by the purchase date, at the Company's option the purchase shall occur on the scheduled date with the purchase price reduced to the extent of all unpaid indebtedness for which the Subject Securities are then pledged or encumbered. Failure by the Company to exercise the Right, or failure by the Company to otherwise perform its obligations under this Subsection 10(c)(ii), within the 30 day period herein prescribed shall be deemed an election by the Company not to exercise the Right. If the Company exercises the Right and is unable for any reason to perform its obligations thereunder in accordance with this Subsection 10(c), the Company may assign all or a portion of its rights under the Right to any one or more of the Company's stockholders (other than the Transferor) ("***Assignee Stockholder***"), as the Board shall determine, in its sole and absolute discretion.

(iii) Purchase of Less Than All Shares. Anything in Subsection 10(c) to the contrary notwithstanding, the Company and any Assignee Stockholder individually may, pursuant to the exercise of the Right, purchase fewer than all of the Subject Securities provided that such Persons in the

aggregate purchase all, and not less than all, of the Subject Securities, and it shall be a condition precedent to the obligation of any of such Persons to purchase any Subject Securities, that all, and not less than all, of the Subject Securities have been elected to be purchased pursuant to the exercise of the Right.

(iv) Failure to Exercise Right or Consummate Transaction. If the Company elects not to exercise the Right, or if the Right is exercised and the obligations to be performed thereunder by the Company are not performed in accordance with this Subsection 10(c), or if the Company's rights are assigned to an Assignee Stockholder and such

Assignee Stockholder fails to perform his or her obligations under the assigned Right in accordance with this Subsection 10(c), then, subject to the application of any applicable state or federal securities laws, the Transferor may dispose of all of the Subject Securities within 90 days after the date of the Statement at the per share price and on the terms, if any, as set forth in the Statement free and clear of the terms of this Subsection 10(c); provided, however, that (A) any subsequent transfer by the Offeror or Donee, as applicable, shall once again be subject to this Subsection 10(c) and (B) if the sale or gift of the Subject Securities is not consummated within such 90-day period, then the Transfer of any such Stock shall once again be subject to the terms of this Subsection 10(c).

(v) Legend. To assure the enforceability of the Company's rights under this Subsection 10(c), until the date of a Qualifying Public Offering, each certificate or instrument representing Stock or an Award held by him, her, or it may, in the Committee's discretion, bear a conspicuous legend in substantially the following form:

> "THE SHARES [REPRESENTED BY THIS CERTIFICATE] [ISSUABLE PURSUANT TO THIS AGREEMENT] ARE SUBJECT TO THE COMPANY'S RIGHT OF FIRST REFUSAL IN THE CASE OF A TRANSFER AS PROVIDED UNDER THE COMPANY'S 2008 LONG TERM INCENTIVE PLAN AND/OR AN AWARD AGREEMENT ENTERED INTO PURSUANT THERETO. COPIES OF SUCH PLAN AND AWARD AGREEMENT ARE AVAILABLE UPON WRITTEN REQUEST TO THE COMPANY AT ITS PRINCIPAL EXECUTIVE OFFICES."

(vi) Expiration. The rights and obligations pursuant to this Subsection 10(c) hereof will terminate upon the date of a Qualifying Public Offering.

(d) Purchase Option.

(i) Except as otherwise expressly provided in any particular Award, (A) if a Participant ceases to be employed by or perform services for the Company or its Parent or Subsidiaries for any reason at any time or (B) upon the occurrence of a Change in Control, the Company (and/or its designee(s)) shall have the option (the "***Purchase Option***") to purchase, and the Participant (or the Participant's executor or the administrator of the Participant's estate in the event of the Participant's death, or the transferee of the Stock or Award in the case of any disposition, or the Participant's legal representative in the event of the Participant's incapacity) (hereinafter, collectively with such Participant, the "***Grantor***") shall sell to the Company and/or its designee(s), all or any portion (at the Company's option) of the shares of Stock issued pursuant to this Plan and held by the Grantor (such shares of Stock herein referred to as the "***Purchasable Shares***").

(ii) The Company shall give notice in writing to the Grantor of the exercise of the Purchase Option within one year of the date of the termination of the Participant's employment or service relationship or the date of the Change in Control. Such notice shall state the number of Purchasable Shares to be purchased and the determination of the Board of the Fair

Market Value per share of such Purchasable Shares, or the Change in Control Price as defined in Subsection 9(f), if applicable. If no notice is given within the time limit specified above, the Purchase Option shall terminate.

(iii) The purchase price to be paid for the Purchasable Shares purchased pursuant to the Purchase Option shall be, the Fair Market Value per share, or the Change in Control Price if applicable, as of the date of the notice of exercise of the Purchase Option times the number of shares being purchased. The purchase price shall be paid in cash. The closing of such purchase shall take place at the Company's principal executive offices within ten (10) days after the purchase price has been determined. At such closing, the Grantor shall deliver to the purchasers the certificates or instruments evidencing the Purchasable Shares being purchased free and clear of all liens and encumbrances (if any), duly endorsed (or accompanied by duly executed stock powers) and otherwise in good form for delivery, against payment of the purchase price by check of the purchasers. In the event that, notwithstanding the foregoing, the Grantor shall have failed to obtain the release of any pledge or other encumbrance on any Purchasable Shares by the scheduled closing date, at the option of the purchasers, the closing shall nevertheless occur on such scheduled closing date, with the cash purchase price being reduced to the extent of all unpaid indebtedness for which such Purchasable Shares are then pledged or encumbered.

(iv) To assure the enforceability of the Company's rights under this Subsection 10(d), until the date of a Qualifying Public Offering, each certificate or instrument representing Stock or an Award held by him, her, or it may, in the Committee's discretion, bear a conspicuous legend in substantially the following form:

> "THE SHARES [REPRESENTED BY THIS CERTIFICATE] [ISSUABLE PURSUANT TO THIS AGREEMENT] ARE SUBJECT TO AN OPTION TO REPURCHASE PROVIDED UNDER THE PROVISIONS OF THE COMPANY'S 2008 LONG TERM INCENTIVE PLAN AND/OR AN AWARD AGREEMENT ENTERED INTO PURSUANT THERETO. COPIES OF SUCH PLAN AND AWARD AGREEMENT ARE AVAILABLE UPON WRITTEN REQUEST TO THE COMPANY AT ITS PRINCIPAL EXECUTIVE OFFICES."

(v) The Company's rights under this Subsection 10(d) shall terminate upon the date of a Qualifying Public Offering.

(e) Taxes. The Company, its Parent and any Subsidiary is authorized to withhold from any Award granted, or any payment relating to an Award under this Plan, including from a distribution of Stock, amounts of withholding and other taxes due or potentially payable in connection with any transaction involving an Award, and to take such other action as the Committee may deem advisable to enable the Company, its Parent or any Subsidiary and Participants to satisfy obligations for the payment of withholding taxes and other tax obligations relating to any Award. This authority shall include authority to withhold or receive Stock or other property and to make cash payments in respect thereof in satisfaction of a Participant's tax obligations, either on a mandatory or elective basis in the discretion of the Committee.

(f) Changes to this Plan and Awards. The Board may amend, alter, suspend, discontinue or terminate this Plan or the Committee's authority to grant Awards under this Plan without the consent of stockholders or Participants, except that any amendment or alteration to this Plan, including any increase in any share limitation, shall be subject to the approval of the Company's stockholders not later than the annual meeting next following such Board action if such stockholder approval is required by any federal or state law or regulation or the rules of any stock exchange or automated quotation system on which the Stock may then be listed or quoted, and the Board may otherwise, in its discretion, determine to submit other such changes to this Plan to stockholders for approval; provided, however, that, without the consent of an affected Participant, no such Board action may materially and adversely affect the rights of such Participant under any previously granted and outstanding Award. The Committee may waive any conditions or rights under, or amend, alter, suspend, discontinue or terminate any Award theretofore granted and any Award agreement relating thereto, except as otherwise provided in this Plan; provided, however, that, without the consent of an affected Participant, no such Committee action may materially and adversely affect the rights of such Participant under such Award.

(g) Limitation on Rights Conferred under Plan. Neither this Plan nor any action taken hereunder shall be construed as (i) giving any Eligible Person or Participant the right to continue as an Eligible Person or Participant or in the employ or service of the Company, its Parent or a Subsidiary, (ii) interfering in any way with the right of the Company, its Parent or a Subsidiary to terminate any Eligible Person's or Participant's employment or service relationship at any time, (iii) giving an Eligible Person or Participant any claim to be granted any Award under this Plan or to be treated uniformly with other Participants or employees or other service providers, or (iv) conferring on a Participant any of the rights of a stockholder of the Company unless and until the Participant is duly issued or transferred shares of Stock in accordance with the terms of an Award.

(h) Unfunded Status of Awards. This Plan is intended to constitute an "unfunded" plan for certain incentive awards.

(i) Nonexclusivity of this Plan. Neither the adoption of this Plan by the Board nor its submission to the stockholders of the Company for approval shall be construed as creating any limitations on the power of the Board or a committee thereof to adopt such other incentive arrangements as it may deem desirable, including incentive arrangements and awards which do not qualify under section 162(m) of the Code. Nothing contained in this Plan shall be construed to prevent the Company, its Parent or any Subsidiary from taking any corporate action which is deemed by the Company, its Parent or such Subsidiary to be appropriate or in its best interest, whether or not such action would have an adverse effect on this Plan or any Award made under this Plan. No employee, beneficiary or other person shall have any claim against the Company, its Parent or any Subsidiary as a result of any such action.

(j) Fractional Shares. No fractional shares of Stock shall be issued or delivered pursuant to this Plan or any Award. The Committee shall determine whether cash, other Awards or other property shall be issued or paid in lieu of such fractional shares or whether such fractional shares or any rights thereto shall be forfeited or otherwise eliminated.

(k) Severability. If any provision of this Plan is held to be illegal or invalid for any reason, the illegality or invalidity shall not affect the remaining provisions hereof, but such provision shall be fully severable and the Plan shall be construed and enforced as if the illegal or invalid provision had never been included herein. If any of the terms or provisions of this Plan or any Award agreement conflict with the requirements of Rule 16b-3 (as those terms or provisions are applied to Eligible Persons who are subject to section 16(b) of the Exchange Act) or section 422 of the Code (with respect to Incentive Stock Options), then those conflicting terms or provisions shall be deemed inoperative to the extent they so conflict with the requirements of Rule 16b-3 (unless the Board or the Committee, as appropriate, has expressly determined that the Plan or such Award should not comply with Rule 16b-3) or section 422 of the Code. With respect to Incentive Stock Options, if this Plan does not contain any provision required to be included herein under section 422 of the Code, that provision shall be deemed to be incorporated herein with the same force and effect as if that provision had been set out at length herein; provided, further, that, to the extent any Option that is intended to qualify as an Incentive Stock Option cannot so qualify, that Option (to that extent) shall be deemed an Option not subject to section 422 of the Code for all purposes of the Plan.

(l) Governing Law. All questions arising with respect to the provisions of the Plan and Awards shall be determined by application of the laws of the State of Delaware, without giving effect to any conflict of law provisions thereof, except to the extent Delaware law is preempted by federal law. The obligation of the Company to sell and deliver Stock hereunder is subject to applicable federal and state laws and to the approval of any governmental authority required in connection with the authorization, issuance, sale, or delivery of such Stock.

(m) Conditions to Delivery of Stock. Nothing herein or in any Award granted hereunder or any Award agreement shall require the Company to issue any shares with respect to any Award if that issuance would, in the opinion of counsel for the Company, constitute a violation of the Securities Act or any similar or superseding statute or statutes, any other applicable statute or regulation, or the rules of any applicable securities exchange or securities association, as then in effect. At the time of any exercise of an Option or Stock Appreciation Right, or at the time of any grant of a Restricted Stock Award, Restricted Stock Unit, or other Award the Company may, as a condition precedent to the exercise of such Option or Stock Appreciation Right or settlement of any Restricted Stock Award, Restricted Stock Unit or other Award, require from the Participant (or in the event of his or her death, his or her legal representatives, heirs, legatees, or distributees) such written representations, if any, concerning the holder's intentions with regard to the retention or disposition of the shares of Stock being acquired pursuant to the Award and such written covenants and agreements, if any, as to the manner of disposal of such shares as, in the opinion of counsel to the Company, may be necessary to ensure that any disposition by that holder (or in the event of the holder's death, his or her legal representatives, heirs, legatees, or distributees) will not involve a violation of the Securities Act or any similar or superseding statute or statutes, any other applicable state or federal statute or regulation, or any rule of any applicable securities exchange or securities association, as then in effect.

(n) Plan Effective Date. This Plan has been adopted by the Board effective as of May 15, 2008.

MIRNA THERAPEUTICS, INC.
2150 Woodward St. #100
Austin, Texas 78744

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NOTICE OF GRANT OF STOCK OPTION

Pursuant to the terms and conditions of the Mirna therapeutics, Inc. 2008 Long Term Incentive Plan, attached as Appendix A (the "Plan"), and the associated Stock Option Agreement, attached as Appendix B (the "Option Agreement"), you are hereby granted an option (this "Option") to purchase shares of Stock under the conditions set forth below, in the Option Agreement, and in the Plan. Capitalized terms used but not defined herein shall have the meanings set forth in the Plan.

Type of Option: Check one (and only one) of the following:

o **Incentive Stock Option** (This Option **is** intended to be an Incentive Stock Option (as defined in the Plan).)

o **Nonstatutory Stock Option** (This Option **is not** intended to be an Incentive Stock Option (as defined in the Plan).)

Optionee:

Date of Grant: , 20 ("Date of Grant")

Vesting Commencement Date: , 20 ("Vesting Commencement Date")

Number of Shares:

Option Price: $ per share.

Note: In the case of an Incentive Stock Option, the Option Price must be at least 100% (or, in the case of a 10% shareholder of the Company, 110%) of the Fair Market Value (as defined in the Plan) of a share of Stock on the Date of Grant.

Expiration Date: , 20 .

Note: In the case of an Incentive Stock Option, this date cannot be more than ten years (or in the case of a 10% shareholder of the Company, more than five years) from the Date of Grant.

Vesting Schedule: Subject to the other terms and conditions set forth herein, the Option Agreement and in the Plan, this Option may be exercised in cumulative installments as follows, provided that you remain in the employ of or a service provider to the Company or its Subsidiaries until the following applicable dates:

By your signature and the signature of the Company's representative below, you and the Company hereby acknowledge your receipt of this Option granted on the Grant Date indicated above, which has been issued to you under the terms and conditions of the Plan and the Option Agreement. You further acknowledge receipt of the copy of the Plan and Option Agreement and agree to all of the terms and conditions of the Plan and the Option Agreement, which are incorporated in this Option by reference.

You understand and acknowledge that if the purchase price of the Stock under this Option is less than the Fair Market Value of such Stock on the date of grant of this Option, then you may incur adverse tax consequences under sections 409A and/or 422 of the Code. You acknowledge and agree that (a) you are not relying upon any determination by the Company, its affiliates, or any of their respective employees, directors, officers, attorneys or agents (collectively, the "Company Parties") of the Fair Market Value of the Stock on the Date of Grant, (b) you are not relying upon any written or oral statement or representation of the Company Parties regarding the tax effects associated with your execution of this Notice and your receipt, holding and exercise of this Option, and (c) in deciding to enter into this Notice, you are relying on your own judgment and the judgment of the professionals of your choice with whom you have consulted. You hereby release, acquit and forever discharge the Company Parties from all actions, causes of actions, suits, debts, obligations, liabilities, claims, damages, losses, costs and expenses of any nature whatsoever, known or unknown, on account of, arising out of, or in any way related to the tax effects associated with your execution of this Notice and your receipt, holding and exercise of this Option.

Note: To accept the grant of this Option, you must execute this form and return an executed copy to (the "Designated Recipient") by . Failure to return the executed copy to the Designated Recipient by such date will render this Option invalid.

By: _____
Name: _____
Title: _____

Accepted by:

[OPTIONEE]

By: _____
Date: _____

[DESIGNATED RECIPIENT]

By: _____
Date Received: _____

Attachments: Appendix A — Mirna therapeutics, Inc. 2008 Long Term Incentive Plan
Appendix B — Stock Option Agreement

APPENDIX A

MIRNA THERAPEUTICS, INC. 2008 LONG TERM INCENTIVE PLAN

APPENDIX B

STOCK OPTION AGREEMENT

MIRNA THERAPEUTICS, INC.
2008 LONG TERM INCENTIVE PLAN

STOCK OPTION AGREEMENT

This Agreement is made and entered into as of the Date of Grant set forth in the Notice of Grant of Stock Option ("**Notice of Grant**") by and between Mirna therapeutics, Inc., a Delaware corporation (the "**Company**"), and you:

WHEREAS, the Company, in order to induce you to enter into and continue in dedicated service to the Company and to materially contribute to the success of the Company, agrees to grant you an option to acquire an interest in the Company through the purchase of shares of stock of the Company;

WHEREAS, the Company adopted the Mirna therapeutics, Inc. 2008 Long Term Incentive Plan as it may be amended from time to time (the "**Plan**") under which the Company is authorized to grant stock options to certain employees and service providers of the Company;

WHEREAS, a copy of the Plan has been furnished to you and shall be deemed a part of this stock option agreement (the "**Agreement**") as if fully set forth herein and terms capitalized but not defined herein shall have the meaning set forth in the Plan; and

WHEREAS, you desire to accept the option created pursuant to the Agreement.

NOW, THEREFORE, in consideration of the mutual covenants set forth herein and for other valuable consideration hereinafter set forth, the parties agree as follows:

1. The Grant. Subject to the conditions set forth below, the Company hereby grants to you, effective as of the Date of Grant set forth in the Notice of Grant, as a matter of separate inducement and not in lieu of any salary or other compensation for your services for the Company, the right and option to purchase (the "**Option**"), in accordance with the terms and conditions set forth herein and in the Plan, an aggregate of the number of shares of Stock set forth in the Notice of Grant (the "**Option Shares**"), at the Exercise Price set forth in the Notice of Grant.

2. Exercise.

(a) Option Shares shall be deemed "Nonvested Shares" unless and until they have become "Vested Shares." The Option shall in all events terminate at the close of business on the tenth (10) anniversary of the date of this Agreement (the "**Expiration Date**"). Subject to other terms and conditions set forth herein, the Option may be exercised in cumulative installments in accordance with the vesting schedule set forth in the Notice of Grant, provided, that you remain in the employ of or a service provider to the Company or its Subsidiaries until the applicable dates set forth therein.

(b) Subject to the relevant provisions and limitations contained herein and in the Plan, you may exercise the Option to purchase all or a portion of the applicable number of

Vested Shares at any time prior to the termination of the Option pursuant to this Option Agreement. No less than 100 Vested Shares may be purchased at any one time unless the number purchased is the total number of Vested Shares at that time purchasable under the Option. In no event shall you be entitled to exercise the Option for any Nonvested Shares or for a fraction of a Vested Share.

(c) Any exercise by you of the Option shall be in writing addressed to the Secretary of the Company at its principal place of business. Exercise of the Option shall be made by delivery to the Company by you (or other person entitled to exercise the Option as provided hereunder) of (i) an executed "Notice of Stock Option Exercise," and (ii) payment of the aggregate purchase price for shares purchased pursuant to the exercise.

(d) Payment of the Exercise Price may be made, at your election, with the approval of the Company, (i) in cash, by certified or official bank check or by wire transfer of immediately available funds, (ii) by delivery to the Company of a number of shares of Stock having a Fair Market Value as of the date of exercise equal to the Exercise Price, (iii) by the delivery of a note, or (iv) by net issue exercise, pursuant to which the Company will issue to you a number of shares of Stock as to which the Option is exercised, less a number of shares with a Fair Market Value as of the date of exercise equal to the Exercise Price.

(e) If you are on leave of absence for any reason, the Company may, in its sole discretion, determine that you will be considered to still be in the employ of or providing services for the Company, provided, that rights to the Option will be limited to the extent to which those rights were earned or vested when the leave or absence began.

(f) The terms and provisions of the employment agreement or consulting agreement, if any, between you and the Company or any Subsidiary (the "**Employment Agreement**") that relate to or affect the Option are incorporated herein by reference. Notwithstanding the foregoing provisions of this Section 2 or Section 3, in the event of any conflict or inconsistency between the terms and conditions of this Section 2 or Section 3 and the terms and conditions of the Employment Agreement, the terms and conditions of the Employment Agreement shall be controlling.

3. Effect of Termination of Service on Exercisability. Except as provided in Sections 6 and 7 or an Employment Agreement, this Option may be exercised only while you continue to perform services for the Company or any Subsidiary and will terminate and cease to be exercisable upon termination of your service, *except* as follows:

(a) Termination on Account of Disability. If your service with the Company or any Subsidiary terminates by reason of disability (within the meaning of section 22(e)(3) of the Code), this Option may be exercised by you (or your estate or the person who acquires this Option by will or the laws of descent and distribution or otherwise by reason of your death) at any time during the period ending on the earlier to occur of (i) the date that is one year following such termination, or (ii) the Expiration Date, but only to the extent this Option was exercisable for Vested Shares as of the date your service so terminates.

(b) Termination on Account of Death. If you cease to perform services for the Company or any Subsidiary due to your death, your estate, or the person who acquires this Option by will or the laws of descent and distribution or otherwise by reason of your death, may exercise this Option at any time during the period ending on the earlier to occur of (i) the date that is one year following your death, or (ii) the Expiration Date, but only to the extent this Option was exercisable for Vested Shares as of the date of your death.

(c) Termination not for Cause. If your service with the Company or any Subsidiary terminates for any reason other than as described in Sections 3(a) or (b), unless such service is terminated for Cause (as defined below), this Option may be exercised by you at any time during the period ending on the earlier to occur of (i) the date that is three months following your termination, or (ii) the Expiration Date, or by your estate (or the person who acquires this Option by will or the laws of descent and distribution or otherwise by reason of your death) during a period of one year following your death if you die during such three-month period, but in each such case only to the extent this Option was exercisable for Vested Shares as of the date of your termination. "Cause" means "cause" as defined in your Employment Agreement, or in the absence of such an agreement or such a definition, "Cause" will mean a determination by the Committee that you (A) have engaged in personal dishonesty, willful violation of any law, rule, or regulation (other than minor traffic violations or similar offenses), or breach of fiduciary duty involving personal profit, (B) have failed to satisfactorily perform your duties and responsibilities for the Company or any Affiliate, (C) have been convicted of, or plead *nolo contendere* to, any felony or a crime involving moral turpitude, (D) have engaged in negligence or willful misconduct in the performance of your duties, including, but not limited to, willfully refusing without proper legal reason to perform your duties and responsibilities, (E) have materially breached any corporate policy or code of conduct established by the Company or any Subsidiary as such policies or codes may be adopted from time to time, (F) have violated the terms of any confidentiality, nondisclosure, intellectual property, nonsolicitation, noncompetition, proprietary information or inventions agreement, or any other agreement between you and the Company or any Subsidiary related to your service with the Company or any Subsidiary, or (G) have engaged in conduct that is likely to have a deleterious affect on the Company or any Subsidiary or their legitimate business interests, including, but not limited to, their goodwill and public image.

4. Transferability. The Option, and any rights or interests therein will be transferable by you only to the extent approved by the Committee in conformance with Section 10(b) of the Plan.

5. Compliance with Securities Law. Notwithstanding any provision of this Agreement to the contrary, the grant of the Option and the issuance of Stock will be subject to compliance with all applicable requirements of federal, state, and foreign securities laws and with the requirements of any stock exchange or market system upon which the Stock may then be listed. The Option may not be exercised if the issuance of shares of Stock upon exercise would constitute a violation of any applicable federal, state, or foreign securities laws or other law or regulations or the requirements of any stock exchange or market system upon which the Stock may then be listed. In addition, the Option may not be exercised unless (a) a registration statement under the Securities Act of 1933, as amended (the "**Act**"), is at the time of exercise of the Option in effect with respect to the shares issuable upon exercise of the Option or (b) in the

opinion of legal counsel to the Company, the shares issuable upon exercise of the Option may be issued in accordance with the terms of an applicable exemption from the registration requirements of the Act. YOU ARE CAUTIONED THAT THE OPTION MAY NOT BE EXERCISED UNLESS THE FOREGOING CONDITIONS ARE SATISFIED. ACCORDINGLY, YOU MAY NOT BE ABLE TO EXERCISE THE OPTION WHEN DESIRED EVEN THOUGH THE OPTION IS VESTED. The inability of the Company to obtain from any regulatory body having jurisdiction the authority, if any, deemed by the Company's legal counsel to be necessary to the lawful issuance and sale of any shares subject to the Option will relieve the Company of any liability in respect of the failure to issue or sell such shares as to which such requisite authority has not been obtained. As a condition to the exercise of the Option, the Company may require you to satisfy any qualifications that may be necessary or appropriate to evidence compliance with any applicable law or regulation and to make any representation or warranty with respect to such compliance as may be requested by the Company.

6. Extension if Exercise Prevented by Law. Notwithstanding Section 3, if the exercise of the Option within the applicable time periods set forth in Section 3 is prevented by the provisions of Section 5, the Option will remain exercisable until 30 days after the date you are notified by the Company that the Option is exercisable, but in any event no later than the Expiration Date. The Company makes no representation as to the tax consequences of any such delayed exercise. You should consult with your own tax advisor as to the tax consequences of any such delayed exercise.

7. Extension if You are Subject to Section 16(b). Notwithstanding Section 3, if a sale within the applicable time periods set forth in Section 3 of shares acquired upon the exercise of the Option would subject you to suit under Section 16(b) of the Securities Exchange Act of 1934, as amended, the Option will remain exercisable until the earliest to occur of (a) the 10th day following the date on which a sale of such shares by you would no longer be subject to such suit, (b) the 190th day after your termination of service with the Company and any Subsidiary, or (c) the Expiration Date. The Company makes no representation as to the tax consequences of any such delayed exercise. You should consult with your own tax advisor as to the tax consequences of any such delayed exercise.

8. Withholding Taxes. The Committee may, in its discretion, require you to pay to the Company at the time of the exercise of an Option or thereafter, the amount that the Committee deems necessary to satisfy the Company's current or future obligation to withhold federal, state or local income or other taxes that you incur by exercising an Option. In connection with such an event requiring tax withholding, you may (a) direct the Company to withhold from the shares of Stock to be issued to you the number of shares necessary to satisfy the Company's obligation to withhold taxes, that determination to be based on the shares' Fair Market Value as of the date of exercise; (b) deliver to the Company sufficient shares of Stock (based upon the Fair Market Value as of the date of such delivery) to satisfy the Company's tax withholding obligation; or (c) deliver sufficient cash to the Company to satisfy its tax withholding obligations. If you elect to use a Stock withholding feature you must make the election at the time and in the manner that the Committee prescribes. The Committee may, at its sole option, deny your request to satisfy withholding obligations through shares of Stock instead of cash. In the event the Committee subsequently determines that the aggregate Fair Market

Value (as determined above) of any shares of Stock withheld or delivered as payment of any tax withholding obligation is insufficient to discharge that tax withholding obligation, then you shall pay to the Company, immediately upon the Committee's request, the amount of that deficiency in the form of payment requested by the Committee.

9. Status of Stock. With respect to the status of the Stock, at the time of execution of this Agreement you understand and agree to all of the following:

(a) You understand that at the time of the execution of this Agreement the shares of Stock to be issued upon exercise of this Option have not been registered under the Act or any state securities law and that the Company does not currently intend to effect any such registration. In the event exemption from registration under the Act is available upon an exercise of this Option, you (or such other person permitted to exercise this Option if applicable), if requested by the Company to do so, will execute and deliver to the Company in writing an agreement containing such provisions as the Company may require to ensure compliance with applicable securities laws.

(b) You agree that the shares of Stock that you may acquire by exercising this Option will be acquired for investment without a view to distribution, within the meaning of the Act, and will not be sold, transferred, assigned, pledged, or hypothecated in the absence of an effective registration statement for the shares under the Act and applicable state securities laws or an applicable exemption from the registration requirements of the Act and any applicable state securities laws. You also agree that the shares of Stock that you may acquire by exercising this Option will not be sold or otherwise disposed of in any manner that would constitute a violation of any applicable securities laws, whether federal or state.

(c) You agree that (i) the Company may refuse to register the transfer of the shares of Stock purchased under this Option on the stock transfer records of the Company if such proposed transfer would in the opinion of counsel satisfactory to the Company constitute a violation of any applicable securities law and (ii) the Company may give related instructions to its transfer agent, if any, to stop registration of the transfer of the shares of Stock purchased under this Option.

10. Adjustments. The terms of the Option shall be subject to adjustment from time to time, in accordance with the following provisions:

(a) If at any time, or from time to time, the Company shall subdivide as a whole (by reclassification, by a Stock split, by the issuance of a distribution on Stock payable in Stock or otherwise) the number of shares of Stock then outstanding into a greater number of shares of Stock, then (i) the number of shares of Stock (or other kind of securities) that may be acquired under the Option shall be increased proportionately and (ii) the Exercise Price for each share of Stock (or other kind of shares or securities) subject to the then outstanding Option shall be reduced proportionately, without changing the aggregate purchase price or value as to which the outstanding Option remains exercisable or subject to restrictions.

(b) If at any time, or from time to time, the Company shall consolidate as a whole (by reclassification, reverse Stock split or otherwise) the number of shares of Stock then

outstanding into a lesser number of shares of Stock, (i) the number of shares of Stock (or other kind of shares or securities) that may be acquired under the Option shall be decreased proportionately and (ii) the Exercise Price for each share of Stock (or other kind of shares or securities) subject to the then outstanding Option shall be increased proportionately, without changing the aggregate purchase price or value as to which the outstanding Option remains exercisable or subject to restrictions.

(c) Whenever the number of shares of Stock subject to the Option and the price for each share of Stock subject to the Option are required to be adjusted as provided in this Section 10, the Committee shall promptly prepare a notice setting forth, in reasonable detail, the event requiring adjustment, the amount of the adjustment, the method by which such adjustment was calculated, and the change in price and the number of shares of Stock, other securities, cash, or property purchasable by you pursuant to the exercise of the Option or subject to the Option after giving effect to the adjustments. The Committee shall promptly give you such a notice.

(d) Adjustments under this Section 10 shall be made by the Committee, and its determination as to what adjustments shall be made and the extent thereof shall be final, binding, and conclusive. No fractional interest shall be issued under the Plan on account of any such adjustments.

11. Right of First Refusal. This Option and any Stock that may be acquired pursuant hereto is subject to the provisions of Section 10(c) of the Plan.

12. Purchase Option. This Option and any Stock that may be acquired pursuant hereto is subject to the provisions of Section 10(d) of the Plan.

13. Forfeiture for Detrimental Activity. This Option and any Stock that may be acquired pursuant hereto is subject to the provisions of Section 7(e) of the Plan.

14. Lock-Up Period. You hereby agrees that, if so requested by the Company or any representative of the underwriters (the "**Managing Underwriter**") in connection with any registration of the offering of any securities of the Company under the Act, you will not sell or otherwise transfer any Option Shares or other securities of the Company during the 180-day period (or such other period as may be requested in writing by the Managing Underwriter and agreed to in writing by the Company) (the "**Market Standoff Period**") following the effective date of a registration statement of the Company filed under the Act. Such restriction will apply only to the first registration statement of the Company to become effective under the Act that includes securities to be sold on behalf of the Company to the public in an underwritten public offering under the Act. The Company may impose stop-transfer instructions with respect to securities subject to the foregoing restrictions until the end of such Market Standoff Period.

15. Stockholder Agreement. The Committee may, in its sole discretion, condition the delivery of Stock pursuant to the exercise of this Option upon your entering into a stockholder agreement in such form as approved from time to time by the Board.

16. Legends. The Company may at any time place legends, referencing any restrictions imposed on the shares pursuant to Sections 9, 11, 12, or 13 of this Agreement, and

any applicable federal, state or foreign securities law restrictions, on all certificates representing shares of Stock subject to the provisions of this Agreement.

17. Notice of Sales Upon Disqualifying Disposition of ISO. If the Option is designated as an Incentive Stock Option in the Notice of Grant, you must comply with the provisions of this Section. You must promptly notify the Chief Financial Officer of the Company if you dispose of any of the shares acquired pursuant to the Option within one year after the date you exercise all or part of the Option or within two years after the Date of Grant. Until such time as you dispose of such shares in a manner consistent with the provisions of this Agreement, unless otherwise expressly authorized by the Company, you must hold all shares acquired pursuant to the Option in your name (and not in the name of any nominee) for the one-year period immediately after the exercise of the Option and

the two-year period immediately after the Date of Grant. At any time during the one-year or two-year periods set forth above, the Company may place a legend on any certificate representing shares acquired pursuant to the Option requesting the transfer agent for the Company's stock to notify the Company of any such transfers. Your obligation to notify the Company of any such transfer will continue notwithstanding that a legend has been placed on the certificate pursuant to the preceding sentence.

18. Right to Terminate Services. Nothing contained in this Agreement shall confer upon you the right to continue in the employ of or performing services for the Company or any Subsidiary, or interfere in any way with the rights of the Company or any Subsidiary to terminate your employment or service relationship at any time.

19. Furnish Information. You agree to furnish to the Company all information requested by the Company to enable it to comply with any reporting or other requirement imposed upon the Company by or under any applicable statute or regulation.

20. Remedies. The Company shall be entitled to recover from you reasonable attorneys' fees incurred in connection with the enforcement of the terms and provisions of this Agreement whether by an action to enforce specific performance or for damages for its breach or otherwise.

21. No Liability for Good Faith Determinations. The Company and the members of the Committee and the Board shall not be liable for any act, omission or determination taken or made in good faith with respect to this Agreement or the Option granted hereunder.

22. Execution of Receipts and Releases. Any payment of cash or any issuance or transfer of shares of Stock or other property to you, or to your legal representative, heir, legatee or distributee, in accordance with the provisions hereof, shall, to the extent thereof, be in full satisfaction of all claims of such persons hereunder. The Company may require you or your legal representative, heir, legatee or distributee, as a condition precedent to such payment or issuance, to execute a release and receipt therefore in such form as it shall determine.

23. No Guarantee of Interests. The Board and the Company do not guarantee the Stock of the Company from loss or depreciation.

24. Company Records. Records of the Company regarding your service and other matters shall be conclusive for all purposes hereunder, unless determined by the Company to be incorrect.

25. Notice. All notices required or permitted under this Agreement must be in writing and personally delivered or sent by mail and shall be deemed to be delivered on the date on which it is actually received by the person to whom it is properly addressed or if earlier the date sent via certified mail.

26. Waiver of Notice. Any person entitled to notice hereunder may, by written form, waive such notice.

27. Information Confidential. As partial consideration for the granting of this Option, you agree that you will keep confidential all information and knowledge that you have relating to the manner and amount of your participation in the Plan; provided, however, that such information may be disclosed as required by law and may be given in confidence to your spouse, tax and financial advisors. In the event any breach of this promise comes to the attention of the Company, it shall take into consideration that breach in determining whether to recommend the grant of any future similar award to you, as a factor weighing against the advisability of granting any such future award to you.

28. Successors. This Agreement shall be binding upon you, your legal representatives, heirs, legatees and distributees, and upon the Company, its successors and assigns.

29. Severability. If any provision of this Agreement is held to be illegal or invalid for any reason, the illegality or invalidity shall not affect the remaining provisions hereof, but such provision shall be fully severable and this Agreement shall be construed and enforced as if the illegal or invalid provision had never been included herein.

30. Company Action. Any action required of the Company shall be by resolution of the Board or by a person authorized to act by resolution of the Board.

31. Headings. The titles and headings of paragraphs are included for convenience of reference only and are not to be considered in construction of the provisions hereof.

32. Governing Law. All questions arising with respect to the provisions of this Agreement shall be determined by application of the laws of Delaware, without giving any effect to any conflict of law provisions thereof, except to the extent Delaware law is preempted by federal law. The obligation of the Company to sell and deliver Stock hereunder is subject to applicable laws and to the approval of any governmental authority required in connection with the authorization, issuance, sale, or delivery of such Stock.

33. Word Usage. Words used in the masculine shall apply to the feminine where applicable, and wherever the context of this Agreement dictates, the plural shall be read as the singular and the singular as the plural.

34. No Assignment. You may not assign this Agreement or any of your rights under this Agreement without the Company's prior written consent, and any purported or attempted assignment without such prior written consent shall be void.

35. Acknowledgements Regarding Section 409A and Section 422 of the Code. You understand that if the purchase price of the Stock under this Option is less than the Fair Market Value of such Stock on the Date of Grant of this Option, then you may incur adverse tax consequences under section 409A and Section 422 of the Code. You acknowledge and agree that (a) you are not relying upon any determination by the Company, its affiliates, or any of their respective employees, directors, officers, attorneys or agents (collectively, the "**Company Parties**") of the Fair Market Value of the Stock on the Date of Grant, (b) you are not relying upon any written or oral statement or representation of the Company Parties regarding the tax effects associated with your execution of this Agreement and your receipt, holding and exercise of this Option, and (c) in deciding to enter into this Agreement, you are relying on your own judgment and the judgment of the professionals of your choice with whom you have consulted. You hereby release, acquit and forever discharge the Company Parties from all actions, causes of

actions, suits, debts, obligations, liabilities, claims, damages, losses, costs and expenses of any nature whatsoever, known or unknown, on account of, arising out of, or in any way related to the tax effects associated with your execution of this Agreement and your receipt, holding and exercise of this Option.

36. Miscellaneous.

(a) This Agreement is subject to all the terms, conditions, limitations and restrictions contained in the Plan. In the event of any conflict or inconsistency between the terms hereof and the terms of the Plan, the terms of the Plan shall be controlling.

(b) The Option may be amended by the Board or by the Committee at any time (i) if the Board or the Committee determines, in its sole discretion, that amendment is necessary or advisable in light of any addition to or change in any federal or state, tax or securities law or other law or regulation, which change occurs after the Date of Grant and by its terms applies to the Option; or (ii) other than in the circumstances described in clause (i) or provided in the Plan, with your consent.

(c) If this Option is intended to be an incentive stock option designed pursuant to section 422 of the Code, then in the event the Option Shares (and all other options designed pursuant to section 422 of the Code granted to you by the Company or any parent of the Company or Subsidiary) that first become exercisable in any calendar year have an aggregate fair market value (determined for each Option Share as of the Date of Grant) that exceeds $100,000, the Option Shares in excess of $100,000 shall be treated as subject to a Nonstatutory Stock Option.

[Signature Page Follows]

Please indicate your acceptance of all the terms and conditions of the Award and the Plan by signing and returning a copy of this Agreement.

MIRNA THERAPEUTICS, INC.,
a Delaware corporation

By: _____
Name: _____
Title: _____

ACCEPTED:

_____
Signature of Optionee

_____
Name of Optionee (Please Print)

Date: _____

SUBLEASE

This Sublease (the "**Sublease**") is dated October 31, 2014 (the "**Sublease Commencement Date**"), and is between Asuragen, Inc., a Delaware corporation ("**Sublandlord**"), and Mirna Therapeutics, Inc., a Delaware corporation ("**Subtenant**").

RECITALS

A. Sublandlord, as successor to Ambion Diagnostics, Inc., is the tenant under that certain Industrial Lease, dated as of February 24, 2006, between Texas Industrial REIT Portfolio, Limited Partnership, a Delaware limited partnership, as successor to TIAA Realty, Inc., a Delaware corporation, ("**Prime Landlord**"), as the landlord, and Ambion Diagnostics, Inc., a Delaware corporation, as the tenant, as amended pursuant to that certain First Amendment to Industrial Lease, dated June 14, 2006, and that certain Second Amendment to Industrial Lease, dated as of June 30, 2011 (the "**Second Amendment**," and collectively, the "**Prime Lease**") under which Sublandlord leases approximately 69,638 rentable square feet, approximately 47,430 rentable square feet of which are located in Building F and approximately 22,208 rentable square feet of which are in Building P, and all as depicted on Exhibit A to the Second Amendment (the "**Prime Lease Premises**"). Each capitalized term in this Sublease that this Sublease does not define has the meaning the Prime Lease gives it.

B. Sublandlord and Subtenant desire that Subtenant sublease the Sublease Premises (as defined below) on the terms and conditions set forth herein

C. Sublandlord and Subtenant are parties to that certain Services Agreement, dated as of January 1, 2013 (as amended from time to time, the "**TSA**") pursuant to which Sublandlord provides certain services to Subtenant, and Sublandlord is compensated by Subtenant for such services.

D. Subtenant shall lease the following pursuant hereto the (the "**Sublease Premises**"):

(i) the Prime Lease Premises, on a non-exclusive basis, to be occupied jointly with the Sublandlord, consistent with the current practice of Sublandlord and Subtenant on the date of this Sublease;

(ii) primary use (subject only to the use by Sublandlord for ingress and egress and to perform Sublandlord's obligation(s) hereunder, under the TSA, and under the Prime Lease) to that portion of the Prime Lease Premises depicted on Exhibit B hereto, consistent with the current practice of Sublandlord and Subtenant on the date of this Sublease;

(iii) lab space, vivarium and histology laboratory , on a non-exclusive basis, apportioned based on the percentage use of each party; and

AGREEMENT

In consideration of the mutual agreements contained herein, and for other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, Sublandlord and Subtenant agree as follows:

1. **Sublease.** Sublandlord hereby subleases to Subtenant the Sublease Premises on the terms and conditions of this Sublease. This Sublease is subject and subordinate to the Prime Lease and to all liens and other matters to which the Prime Lease is subordinate.

2. **Prime Lease and Partial Incorporation of Prime Lease Provisions.**

A. The sections of the Prime Lease listed below are hereby incorporated into this Sublease (such incorporated terms being the "**Incorporated Terms**") with the same effect as if they were written out in full in this Sublease, except that, to the extent not provided otherwise in this Sublease, (i) the following terms in the Prime Lease are replaced in the Incorporated Terms as follows: "Landlord" is replaced with "Sublandlord," "Tenant" is replaced with "Subtenant," "Leased Premises" is replaced with "Sublease Premises," "Lease Term" is replaced with "Sublease Term," and "Rent" is replaced with "Sublease Rent"; and (ii) each provision of the Incorporated Terms that is inconsistent with any provision actually written out in this Sublease shall be deemed to be amended by such provision that is actually written out in this Sublease, with the effect that the actual written terms of this Sublease shall control over any inconsistent provisions of the Incorporated Terms.

(i) The following sections of the Prime Lease are incorporated in their entirety (except as expressly provided otherwise below) as contemplated above: Sections 13 (and Exhibit D, to the extent applicable), 15, 16, 17, 18 (except the last sentence of Section 18(a), 21, 24, 26 (except for 26(a), 26(b) and 26(h), 27, 28, 29, 30, 31, 32, 34, 37, 40, 41, 42, 43, 45, 47, 49, 50, 52, 53, 55, and 58.

(ii) Section 1 of the Prime Lease is incorporated as contemplated above, but only to the extent of the definitions of the terms "Permitted Use," "Tenant Party(ies)," "Landlord Party(ies)," "Building" and "Project."

(iii) The first sentence of Section 7 of the Prime Lease is incorporated as contemplated above.

(iv) The following sections of the Prime Lease are incorporated as contemplated above, but references to "Landlord" shall be references to "Prime Landlord" and not to "Sublandlord": Sections 19, 33, 36, 39 and 56, and Exhibit C.

(v) The provisions of Section 11 of the Prime Lease are incorporated as contemplated above, but references to "Tenant" shall be references to "Sublandlord," and references to "Landlord" shall be references to the "Prime Landlord."

(vi) Provisions of Section 57 shall be incorporated, with the allocation of parking spaces between Sublandlord and Subtenant to be apportioned based on current practice of Sublandlord and Subtenant on the date of this Sublease and their relative use of the premises.

All other terms and provisions of the Prime Lease, including the provisions of the Second Amendment, are not incorporated into this Sublease.

3. **Sublease Term.** The term of this Sublease (the "**Sublease Term**") shall commence on the Sublease Commencement Date and shall end on the earlier of the expiration or earlier termination of the TSA, or the expiration date of the Prime Lease, as the same may be extended from time to time, unless sooner

terminated in accordance with the terms of this Sublease. Sublandlord and Subtenant shall have the right to terminate this Sublease at any time upon no less than six (6) months written notice to the other party.

The parties acknowledge that Subtenant does not have exclusive use of the Sublease Premises, and that the Sublease Premises are maintained by Sublandlord pursuant to the TSA, and that upon the termination of this Sublease the Subleased Premises shall be turned over to Sublandlord in their then "as is" condition, and no restoration shall be required of Subtenant, [provided, however, that Subtenant shall comply with all of its repair and maintenance obligations under this Sublease and shall remove all of its trade fixtures, data and phone

cables, equipment and other personal property in accordance with Sections 14(a) and 16 of the Prime Lease].

4. **Sublease Rent.** Subtenant shall pay sublease rent (the "**Sublease Rent**") in the amount of $7,400 per month. The Sublease Rent has been determined based on each party's respective percentage use of the Prime Lease Premises taking into account the square footage of primary use space for each party, and each party's percentage use of shared space. Each installment of Sublease Rent is due in advance, without demand, or notice, or offset, on the first day of each calendar months (with the Sublease Rent prorated for partial months). Sublease Rent amount is subject to adjustment as mutually agreed upon by Sublandlord and Subtenant upon renewal of the Prime Lease or change by the Subtenant in percentage use of the Prime Lease Premises. Subtenant shall pay all Sublease Rent to Sublandlord at the following address: Asuragen, Inc. Attention: Accounts Receivable, 2150 Woodward, Suite 100, Austin, TX 78744.

5. **Pass-Through of Additional Rent.** The parties acknowledge that the Subtenant pays its share of the operation of the Prime Lease Premises (i.e. the costs of the Subleased Premises) pursuant to the TSA, and there shall be no additional charges or pass-through of costs from the Prime Lease pursuant hereto, other than the costs for any services provided at the request of Subtenant that are billed directly to Sublandlord or Subtenant.

6. **Sublease Premises.** Subtenant acknowledges that it has accepted possession of, and is currently in occupancy of, the Sublease Premises in their "As-Is" condition on the Sublease Commencement Date. Sublandlord has no obligation whatsoever to perform any tenant improvements or other work in the Sublease Premises in connection with this Sublease, and Subtenant is not entitled to any tenant improvement allowance, move-in allowance or similar inducement to enter into this Sublease. Sublandlord has no liability for, or obligation to repair, any patent or latent defect in the Sublease Premises.

7. **Agreements Concerning Prime Lease.**

(a) Sublandlord agrees for the benefit of Subtenant; (i) to maintain the Prime Lease in full force and effect throughout the term of this Sublease, subject to any earlier termination by Prime Landlord without fault of Sublandlord; (ii) to perform all obligations and observe all covenants of the Prime Lease to be performed or observed by Sublandlord under the Prime Lease; and (iii) not to amend or in any way modify the Prime Lease in any manner that would materially adversely affect Subtenant without Subtenant's prior written notice. Subtenant agrees for the benefit of Sublandlord and Prime Landlord to perform all obligations and observe all covenants of the Prime Lease that are Incorporated Terms and that are to be performed or observed by Subtenant under the terms of this Sublease, and further agrees not to take any action that would result in a breach by Sublandlord of its obligations under the Prime Lease (or would result in a breach if Sublandlord were to take the same action). Subtenant agrees that Prime Landlord is an intended third-party beneficiary of this Sublease and that, in the event of a default by Subtenant under the terms of this Sublease, Prime Landlord shall have the right to enforce all rights and remedies available to Sublandlord under this Sublease to the same extent as if Prime Landlord were the Sublandlord under this Sublease, provided, however, that Prime Landlord shall have no obligation or liability to Subtenant under this Sublease.

(b) Notwithstanding anything in this Sublease or the Prime Lease to the contrary, Sublandlord does not assume the obligations of the Prime Landlord under the Prime Lease, and Subtenant agrees that Sublandlord shall not be obligated to furnish for Subtenant any services of any nature whatsoever, unless provided for in the TSA agreement, including, without limitation, the furnishing of heat, ventilation, air conditioning, electrical energy, elevator service, cleaning, window washing, parking, rubbish removal services, and restoration, repair and maintenance services. At the request of Subtenant, Sublandlord shall use commercially reasonable efforts (without any obligation to file suit) to cause Prime Landlord to provide to Subtenant and to the Sublease

Premises all services to be provided to Sublandlord and the Prime Lease Premises by Prime Landlord under the Prime Lease, but only to the extent that (i) such services are applicable to Sublease Premises; and (ii) Prime Landlord is obligated to provide such services to the Sublease Premises pursuant to the terms of the Prime Lease.

(c) At Subtenant's request and expense, Sublandlord shall use its commercially reasonable efforts to seek and obtain any necessary approval of Prime Lessor to any signage desired by Subtenant.

(d) At Subtenant's request and expense, Sublandlord shall use commercially reasonable efforts to seek and obtain any consent or approval of Prime Lessor if required under the Prime Lease.

8. **Mutual Indemnity.** Subject to Section 9 hereof, Subtenant shall indemnify, defend and hold harmless Sublandlord and Sublandlord Parties, as applicable, from all Claims of every kind and character arising out of or relating (directly or indirectly) to the negligence or willful misconduct of Subtenant or of any other of the Subtenant Parties, or the breach by Subtenant of any of its obligations under this Sublease. Subject to Section 9 hereof, Sublandlord shall indemnify, defend and hold harmless Subtenant and Subtenant Parties, as applicable, from all Claims of every kind and character arising out of or relating (directly or indirectly) to the negligence or willful misconduct of Sublandlord or of any other of the Sublandlord Parties, or the breach by Sublandlord of any of its obligations under this Sublease. The provisions of this Section 8 shall survive the termination of this Sublease.

9. **Waiver of Subrogation.** Each party waives all claims that arise or may arise in its favor against the other party, or anyone claiming through or under them, by way of subrogation or otherwise **EVEN IF THE LOSS OR DAMAGE IS CAUSED BY THE FAULT OR NEGLIGENCE OF THE OTHER PARTY OR ANYONE FOR WHOM THE OTHER PARTY IS RESPONSIBLE**), which loss or damage is covered by valid and collectible insurance policies, to the extent of such recovery. Each party shall give notice of this provision to its insurance companies, and have its insurance policies appropriately endorsed to prevent the invalidation of such insurance by reason of this provision.

10. **Casualty; Condemnation.** No casualty to or condemnation of all or any part of the Prime Lease Premises shall have any effect on this Sublease, except that if the Prime Lease is terminated, this Sublease shall terminate concurrently with the Prime Lease.

11. **No Assignment or Subletting.** Subtenant shall have no right to sublease all or any part of the Sublease Premises or assign this Sublease without the prior written consent of Sublandlord not to be unreasonably withheld, provided that no consent of Sublandlord shall be required for the assignment or subletting to an affiliate of the subtenant or any successor to all or substantially all of the business, assets or ownership of Subtenant. Prime Landlord shall be entitled to withhold its consent to any subletting or assignment that Subtenant my request as set forth in the Prime Lease..

12. **No Assignment of Prime Lease.** Sublandlord and Subtenant agree that, notwithstanding that this Sublease Term could be coterminous with the remaining term of the Prime Lease, they do not intend for this Sublease to constitute an assignment of the Prime Lease by Sublandlord to Subtenant.

13. **Termination of Prime Lease.** This Sublease shall terminate immediately upon the termination or expiration of the Prime Lease. Unless the Prime Lease is terminated because of a default under the Prime Lease by Sublandlord, Sublandlord has no liability to Subtenant for any such termination, other than to refund on a prorated basis any unearned prepaid rent for the calendar month in which such termination occurs. Sublandlord has no obligation to exercise any option to renew or extend the Prime Lease.

14. **Notices.** Any notice or demand that either party may or must give to the other under or in connection with this Sublease shall be in writing and shall be either (i) delivered personally, (ii) sent by independent next business day courier, (iii) sent by certified mail, return receipt requested, or (iv) sent by email, with a confirming copy sent by one of the methods in clauses (i) through (iii) within one business day, addressed

if to Sublandlord as follows:

_____
_____
_____

And if to Subtenant as follows:

_____
_____
_____

Notices shall be effective upon delivery or refusal of delivery. Either party may, by notice in writing, direct that future notices or demands be sent to a different address. Sublandlord shall provide to Subtenant copies of each notice exchanged between Sublandlord and Prime Landlord concerning the Prime Lease within five days after such notice is given or received, as applicable. Subtenant and Sublandlord shall each provide to Prime Landlord, immediately upon delivery or receipt, copies of any notices of default given or received under this Sublease.

15. **Holding Over.** Subtenant acknowledges that Subtenant's failure to surrender possession of the Sublease Premises immediately upon the expiration of this Sublease might constitute a default by Sublandlord under the Prime Lease and subject Sublandlord to liability to Prime Landlord. Accordingly, if Subtenant remains in possession of the Sublease Premises after the expiration of this Sublease without the written consent of Sublandlord and Prime Landlord, Subtenant shall be deemed to have detained the Sublease Premises unlawfully. In the event Subtenant holds over following the expiration or termination of the Sublease Term, Subtenant shall pay to Sublandlord upon demand any and all holdover rent and other charges that Sublandlord is liable for under the Prime Lease as a result of such Subtenant holdover. In the absence of a written agreement to the contrary, no tender by Subtenant, and no acceptance by Sublandlord or Prime Landlord, of any payment after the expiration of this Sublease, whether designated as rent or otherwise, shall be deemed to evidence or give rise to a tenancy of any kind, but instead shall be construed as a payment on account of damages resulting from Subtenant's unlawful detention of the Sublease Premises.

16. **Brokers.** Each party represents and warrants to the other that the representing party has had no dealings with any real estate broker or agent in connection with this Sublease, and agrees to indemnify the other party against any loss, claim, damage or expense, including reasonable attorney fees, that may be incurred by such other party in connection with any claim that is inconsistent with the representing party's representation in this Section.

connection with this Sublease shall be in writing and shall be either (i) delivered personally, (ii) sent by independent next business day courier, (iii) sent by certified mail, return receipt requested, or (iv) sent by email, with a confirming copy sent by one of the methods in clauses (i) through (iii) within one business day, addressed

if to Sublandlord as follows:

Asuragen, Inc.

2150 Woodward, Suite 100

Austin, Texas 78744

And if to Subtenant as follows:

Mirna Therapeutics, Inc.

2150 Woodward, Suite 100

Austin Texas 78744

Notices shall be effective upon delivery or refusal of delivery. Either party may, by notice in writing, direct that future notices or demands be sent to a different address. Sublandlord shall provide to Subtenant copies of each notice exchanged between Sublandlord and Prime Landlord concerning the Prime Lease within five

days after such notice is given or received, as applicable. Subtenant and Sublandlord shall each provide to Prime Landlord, immediately upon delivery or receipt, copies of any notices of default given or received under this Sublease.

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16. **Brokers.** Each party represents and warrants to the other that the representing party has had no dealings with any real estate broker or agent in connection with this Sublease, and agrees to indemnify the other party against any loss, claim, damage or expense, including reasonable attorney fees, that may be incurred by such other party in connection with any claim that is inconsistent with the representing party's representation in this Section.

17. **Rules and Regulations.** In addition to and without limitation upon the Rules and Regulations of Prime Landlord under the Prime Lease, Subtenant agrees to comply with the reasonable rules and regulations of Sublandlord that may be promulgated by Sublandlord from time to time by written notice to Subtenant relating to the use of the Sublease Premises, the Building or the Property.

18. **Signing and Delivery.** The parties may sign this Sublease in separate counterparts. If they do, each counterpart is an original and all of the counterparts, when taken together, constitute one and the same instrument. The parties may deliver signed copies of this Lease by email or another electronic means. Each delivery of a copy of a signed original of this Lease, including both paper and electronic copies, has the same binding effect as the delivery of a signed original of this Lease.

19. **Consent of Prime Landlord.** Notwithstanding any other provision of this Sublease, the rights and obligations of each party under this Sublease are contingent on the approval of this Sublease by Prime Landlord on terms acceptable to Sublandlord and Subtenant as contemplated by the Prime Lease.

20. **Entire Agreement.** This Sublease, together with the TSA and all instruments and agreements entered into pursuant thereto, represents the entire agreement between the parties with respect to the subject matter hereof.

Signature Page Follows

IN WITNESS WHEREOF Sublandlord and Subtenant hereby execute and deliver this Sublease as of the date first above written.

Sublandlord:

Asuragen, Inc., a Delaware corporation

By: /s/ Lynne Hohlfeld

Name: Lynne Hohlfeld

Title: CFO

Subtenant:

Mirna Therapeutics, Inc., a Delaware corporation

By: /s/ Jon Irvin

Name: Jon Irvin

Title: CFO

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption "Experts" and to the use of our report dated July 15, 2015, in the Registration Statement (Form S-1) and related Prospectus of Mirna Therapeutics, Inc. for the registration of shares of its common stock.

/s/ Ernst & Young LLP

Austin, Texas
August 24, 2015