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

# FORM 10-K

☑ **Annual report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**
**For the year ended December 31, 2015**
**or**
☐ **Transition report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**
**Commission File Number: 001-37566**

# Mirna Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

| **Delaware** | **26-1824804** |
|---|---|
| (State or other jurisdiction of incorporation or organization) | (I.R.S. Employer Identification No.) |

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

**Securities registered pursuant to Section 12(b) of the Act:**

| **Title of each class** | **Name of exchange on which registered** |
|---|---|
| Common Stock, par value $0.001 per share | NASDAQ Stock Market LLC |

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☑
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act of 1934 (the "Exchange Act"). Yes ☐ No ☑

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days.
Yes ☑ No ☐

Indicate by check mark whether the Registrant has submitted electronically and posted on its corporate website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the Registrant was required to submit and post such files). Yes ☐ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☑

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 ☐ Accelerated filer ☐ Non-accelerated filer ☑ Smaller reporting company ☐
Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☑

The registrant was not a public company as of the last business day of its most recently completed second fiscal quarter, and therefore cannot calculate the aggregate market value of its voting and non-voting common equity held by non-affiliates as of such date.

As of March 15, 2016, there were 20,830,555 shares of the registrant's Common Stock outstanding.

**DOCUMENTS INCORPORATED BY REFERENCE**

Portions of the registrant's Proxy Statement for the registrant's 2015 Annual Meeting of Stockholders are incorporated by reference into Part III of this Form 10-K to the extent stated herein. The Proxy Statement will be filed within 120 days of the registrant's fiscal year ended December 31, 2015.

**MIRNA THERAPEUTICS, INC.**
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## Forward-Looking Statements

This Annual Report on Form 10-K 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 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 regarding:

- 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; 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 Annual Report on Form 10-K 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 Item 1A. “Risk Factors” and elsewhere in this Annual Report on Form 10-K. These forward-looking statements speak only as of the date of this Annual Report on Form 10-K. 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. Given these risks and uncertainties, you are cautioned not to place undue reliance on such forward-looking statements.

**PART I**

**ITEM 1. *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 anti- 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 demonstrated clinical proof of concept as a single agent in our ongoing Phase 1 clinical trial. As a result of observations in the Phase 1 study, we plan to advance into two Phase 2 clinical studies by the end of 2016, one in patients with advanced malignant melanoma, the other in patients with advanced renal cell carcinoma (RCC). We also plan to initiate, in the second half of 2016, an additional Phase 1b translational medicine trial to deepen our insights into the mechanism of action of miR-34 in melanoma patients and to define biomarkers that would aid in furthering the development of MRX34.

We believe that microRNA mimics may 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. Over the past two decades, cancer drug development has moved from systemic cytotoxic chemotherapy to more targeted therapies. First-generation targeted therapies have generally produced lower levels of toxicity than systemic cytotoxic therapies; however, they have done so with variable efficacy outcomes. The recent discoveries of checkpoint inhibitors and other immuno-oncology products have resulted in marked improvements in efficacy. 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 cancer therapies to produce a measurable improvement over current approaches, we believe it will need to yield drugs that can disrupt multiple oncogenic and immuno-oncology pathways. We believe the microRNA field represents a highly promising area for the development of these drugs.

**Our Strategy**

Our corporate strategy includes the following:

- **Advance our lead product candidate, MRX34, through clinical development.** MRX34 is potentially the first in a new class of promising cancer drugs. Mirna is the first to establish clinical proof-of-concept for a microRNA-based replacement therapy for cancer. In our Phase 1 clinical trial we have achieved confirmed partial responses by Response Evaluation Criteria in Solid Tumors (RECIST) in a patient with metastasized hepatocellular carcinoma, a patient with advanced acral melanoma and a patient with advanced RCC. We have also observed a number of patients with long term stable disease during MRX34

treatment. Based on the observed clinical activity, we intend to initiate two Phase 2 clinical studies in patients with melanoma and RCC by the end of 2016.

- **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 analyzing 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. These studies may also assist in selecting patients most likely to benefit from treatment with MRX34 or other product candidates. We also intend to initiate, in late 2017, a dedicated Phase 1b translational medicine study in melanoma patients to further study the mechanism of action and therapeutic activity of MRX34.

- **Expand our clinical development program to additional microRNAs.** Our R&D team's discoveries of tumor suppressor microRNAs critical for controlling various cancer processes, have allowed us to build a broad pipeline of promising tumor suppressor microRNA mimics. Furthermore, any additional Investigational New Drug (IND), applications that we file may create new development, commercialization and partnering opportunities. With additional insights on microRNA-based drug characteristics from our translational medicine clinical trial, we aim to complete selection of a second product candidate by the end of 2016, which we intend to move into IND-enabling preclinical studies in 2017.

- **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 microRNA field. 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 actually or potentially used with miR-34 and our other therapeutic microRNA mimics. We believe our strong intellectual property position can be used to support internal development as well as partnering opportunities.

- **Leverage partnership and collaboration opportunities.** To date, we have focused on establishing proof-of-concept for MRX34, but we anticipate exploring certain partnership opportunities in the future. These may include certain ex-U.S. territories where we do not expect to establish a commercial presence and R&D partnerships to further expand our pipeline or our MRX34 combination therapy development program. In these cases, we anticipate retaining or sharing U.S. commercialization rights. We may also pursue partnerships for our additional product candidates as they progress toward clinical development.

**Biology of microRNAs: A Unique Class in the RNA Therapeutics Space**

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, a process known as translation.

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.

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.

- **Synergies with other therapies.** In 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 chemotherapy, radiation therapy, targeted therapies or potentially also immuno-oncology agents, may work synergistically to treat cancer.

**Our microRNA Platform**

More than 10 years ago, while working at Ambion® , our scientists discovered through extensive microRNA expression and functional assay work that microRNAs are expressed differently 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 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. We 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.

***Delivery of microRNA Mimics to Target Tissues***

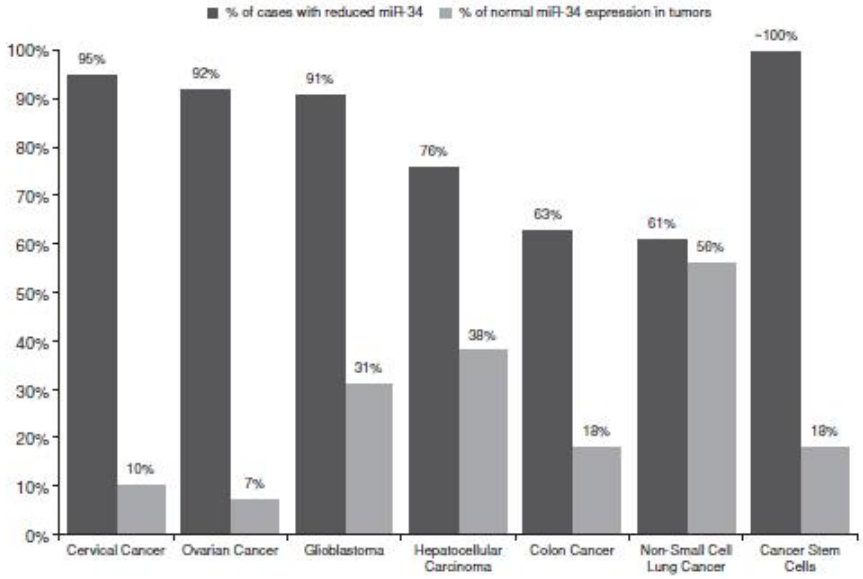
Systemic delivery of oligonucleotides, including microRNAs, has been a major challenge, principally due to the fact that after intravenous administration these molecules have to overcome multiple barriers before reaching their ultimate place of action, which is the RNA-induced silencing complex (RISC)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

We have evaluated a wide variety of proprietary delivery systems with our microRNA compounds for *in vivo* and *ex vivo* testing. As a result of our testing, we selected SMARTICLES® formulation technology, licensed from Marina Biotech, Inc. as our delivery technology for miR-34, based on high therapeutic activity of formulated miR-34 in mouse models of cancer.

We remain confident in our selection of SMARTICLES for our lead therapeutic candidate. However, we continue to evaluate new 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.

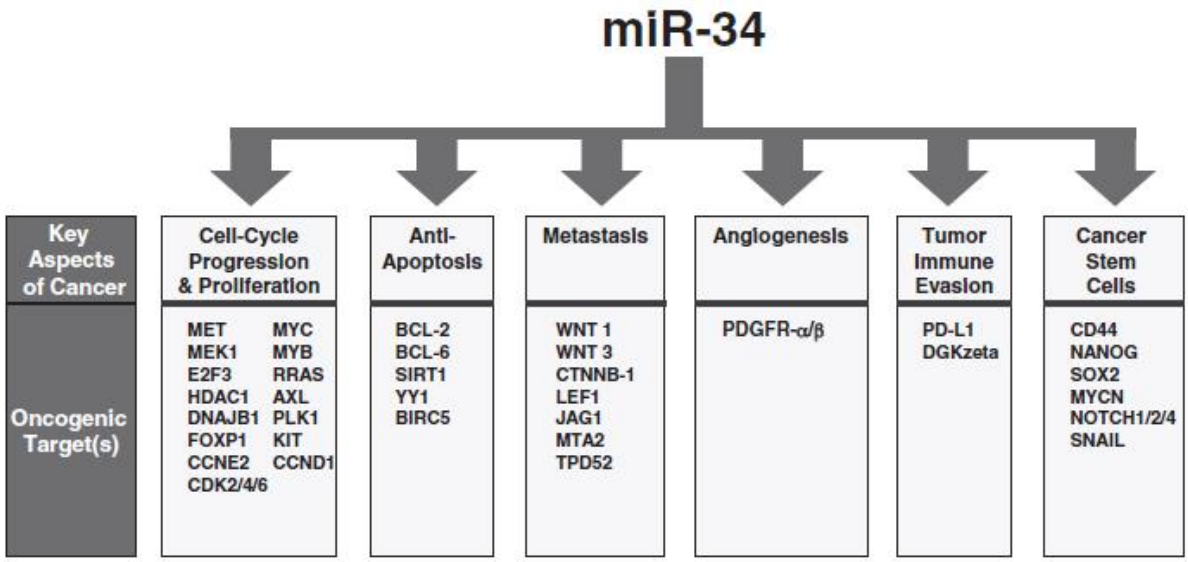
***Selection of miR-34 as Lead Therapeutic Target***

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 set forth in the graph below.




A number of factors could lead to under-expression of miR-34 in cancers, including mutation or methylation of the gene that encodes for miR-34, or mutation or reduced activity of p53, a well-known tumor suppressor protein. miR-34 was initially discovered as a part of the p53 DNA-repair pathway, and functions similarly to the tumor suppressor function of p53, controlling many genes and pathways that are also associated with p53.

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.



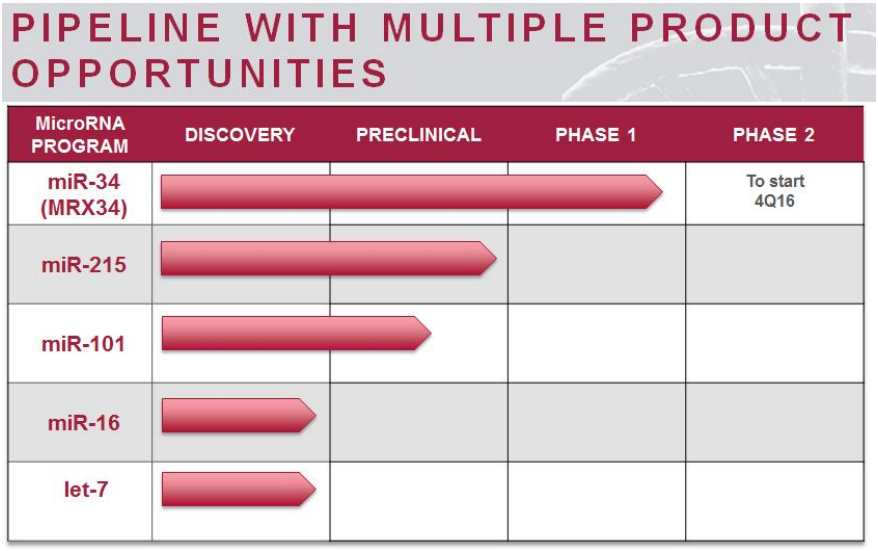

The considerable reduction of miR-34 levels observed in cancer stem cells suggests that the microRNA might play a functional role in preventing normal cells from acquiring stem-like properties, such as cell self-renewal, which can contribute to the development of cancer. In partnership with an academic 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 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 expression may broaden the therapeutic application of MRX34 as a monotherapy as well as in combination with other immuno-oncology therapies.

**Product Pipeline**

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 key oncogenes across multiple 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 mircroRNA mimics potent anti-cancer agents, which may also be less susceptible to developing 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 lists the most advanced microRNA mimics in our pipeline as well as their current stage of research and development:




**MRX34: Our Lead Clinical 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. During preclinical development, we demonstrated that a double-stranded mimic of miR-34 has the 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+).

Based on strong preclinical data and a potential compelling new mechanism for the treatment of cancer, we opened IND applications in the United States and Korea and initiated our first-in-human Phase 1 clinical trial, titled MRX34-101.

***MRX34-101 Our Phase 1 Clinical Trial***

***Trial Design***

MRX34-101 is a multi-center, open label Phase 1 clinical trial to evaluate MRX34 as a single agent in multiple advanced solid tumors and various hematological malignancies (leukemia, lymphoma, myelodysplastic syndrome and multiple myeloma).

Primary objectives of the Phase 1 clinical trial are to establish the maximum tolerated dose (MTD) and an appropriate dose for expansion cohorts and future Phase 2 clinical trials. 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 to determine next clinical development steps.

The Phase 1 clinical trial design consists of an initial dose-escalation phase, followed by an expansion phase after a MTD and recommended Phase 2 doses (RP2D) are identified. During the expansion phase of the trial, patients being treated at the RP2D may undergo tumor biopsies to identify potential biomarkers for assessing delivery and activity of miR-34, and/or predicting response to MRX34. The Phase 1 clinical trial is not designed to show statistical significance of the study endpoints.

The trial was initiated in April 2013 and as of December 31, 2015, 122 patients in total have been enrolled across all patient cohorts and all dose levels at five sites in the United States and three sites in Korea, including 99 patients with various advanced solid tumors and 23 patients with hematological malignancies.

Two dosing schedules have been studied in the clinical trial. The first consisted of treatment twice weekly or BIW, for three weeks in 28-day cycles (the BIW schedule). The second includes treatment daily for five consecutive days, or QD × 5, in 21-day cycles (the QD × 5 schedule).

***Safety Profile***

As of December 31, 2015:

- 47 advanced solid tumor patients have been treated on the BIW schedule, The MTD of MRX34 was found to be 110 mg/m$^2$ among patients with advanced solid tumors with liver involvement.
- The other 52 advanced solid tumor patients and the 23 patients with hematological malignancies have been or are being treated on the QD × 5 schedule. The MTD and RP2D of MRX34 with this dosing schedule have been established at 70 mg/m$^2$ for primary liver cancer (hepatocellular carcinoma, or HCC) patients and 93 mg/m$^2$ for non-HCC solid tumor patients.

Patients treated on the QD × 5 dosing schedule demonstrated higher drug exposure based on pharmacokinetic parameters, and better treatment tolerability. Based on these observations, we have selected the QD × 5 dosing as the preferred dosing schedule for all new patients enrolled in our clinical trials.

In the dose escalation portion of our Phase 1 trial of MRX34, patients were treated starting at the 10 mg/m$^2$ BIW and the 33 mg/m$^2$ QD x 5 dose level, respectively. During and after intravenous drug infusion, 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. Many of the most common adverse events associated with MRX34 are similar to those reported with other liposomal drug formulations 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,

including high dose dexamethasone before, during, and shortly after MRX34 infusions, temporary slowing of infusions, delaying or stopping dosing, or using magnetic resonance imaging, or MRI, to detect silent brain metastases.

Through December 31, 2015, two deaths have occurred in the Phase 1 study, which were considered possibly or probably related to the study drug by the investigators. One treatment-related death occurred in a 77-year old patient with kidney cancer metastasized to the lungs. We believe that the patient experienced immune-mediated pneumonitis and colitis, which have been observed with immuno-oncology drugs and are included in FDA-approved drug labels. The second treatment-related death that was considered possibly related to drug occurred in a 73-year old patient with advanced metastatic small cell lung cancer (SCLC) who expired from sepsis.

The treatment-related serious adverse events occurring in more than one patient were as follows (as of December 31, 2015):

- Among the 47 patients in the BIW dosing cohort, fever, fatigue, dehydration and elevation of liver enzymes, each occurred in two patients.

- For the 75 patients in the QD × 5 dosing cohort, capillary leak syndrome, delirium or altered mental status, and bleeding in silent or asymptomatic HCC brain metastasis each occurred in two patients; elevation of liver enzymes, fever, and thrombocytopenia each occurred in four patients. In both cases of capillary leak syndrome the patients were receiving low-dose dexamethasone (4 mg BID). Following these safety events the investigators were instructed to use high-dose dexamethasone (10 mg BID) as premedication for all patients and to administer high-dose corticosteroids for grade 2 or greater capillary leak syndrome.

***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 blood samples analyzed as of December 31, 2015. 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.

We demonstrated a dose dependent repression of miR34 target oncogenes in patients treated with MRX34 using independent, quantitative Polymerase Chain Reaction (qPCR) and Next Generation Sequencing (NGS) analyses in white blood cells from patients treated with MRX34 in the QD × 5 dosing schedule. In addition, we confirmed that miR34 is delivered to the liver tumors in MRX34 treated patients, using chromogenic miR-34a in situ hybridization (CISH). Based on available liver core biopsies to date, we have been able to demonstrate delivery of MRX34 to normal hepatocytes, Kupffer cells, and polygonal-shaped melanoma tumor cells. We are now determining the local activity of the miR-34a mimic in these liver and tumor tissues. Based on these data, we believe that the systemic administration of MRX34 to patients with different cancer types increased the levels of active miR-34 in white blood cells and reduced the levels of biological targets of the miRNA.

***Efficacy Observations***

In the BIW cohort, 47 patients were treated, including 14 patients with advanced primary liver cancer and 33 with other solid tumors. Within this cohort, 38 patients were evaluable for response, based on availability of baseline and follow-up scans or clinical disease progression as determined by the study investigators.

- One primary liver cancer patient achieved a confirmed partial response after six cycles of treatment per independent radiology review using Response Evaluation Criteria in Solid Tumors (RECIST) criteria. RECIST criteria are the standard method for evaluating solid tumor response in oncology clinical trials. This patient had a history of hepatitis-B infection and metastases to the lungs. After initial liver tumor resection, the patient was enrolled into the 70 $mg/m^2$ dose cohort of MRX34 on the BIT schedule. As of December 31, 2015, the patient showed continued confirmed partial response after 13 cycles and stable disease after 15 cycles (more than one year).

- In addition, six of the 38 evaluable patients showed stable disease varying between two and eight cycles in length as determined by the study investigators, and at various dose levels.

In the QD × 5 cohort, 52 patients with advanced solid tumors were enrolled as of December 31, 2015. Within this cohort, 28 patients had primary liver cancer, two had RCC, two had acral melanoma and 20 had other types of solid tumors. Dosing in the QD × 5 cohort is ongoing.

- One of two acral melanoma patients achieved a confirmed partial response per independent radiology review using RECIST criteria after receiving four cycles of MRX34 treatment in the 110 mg/m$^2$ dose cohort. This patient entered our MRX34-101 trial with metastatic disease that had progressed after multiple previous treatments, including thumb amputation, therapy with Tumor Infiltrating Lymphocytes (TIL) infusion and IL-2, ipilimumab (Yervoy®) and pembrolizumab (Keytruda®). Despite a confirmed partial response the patient decided to discontinue study participation due to study fatigue after 7 cycles of MRX34 treatment. However, as of December 31, 2015 and after more than four months of no treatment with MRX34 or any other agents, the patient remained in confirmed partial response.

- One of the two metastatic RCC patients also achieved a confirmed partial response per independent radiology review using RECIST criteria after receiving three cycles of MRX34 treatment in the 110 mg/m$^2$ dose cohort. This patient entered our trial with advanced metastatic RCC that had progressed after kidney resection, previous treatment with sunitinib (Sutent®), and subsequently progressed on temsirolimus (Torisel®) and bevacizumab (Avastin®). After three cycles of therapy with MRX34, treatment was discontinued due to rising liver enzymes, later shown on biopsy to be due to immune hepatitis. As of December 31, 2015, including more than four months of no treatment with MRX34 or any other agent, the patient remained in confirmed partial response.

- The long-term responses observed in the two patients who achieved confirmed partial responses in the QD × 5 schedule may indicate an immune-mediated effect, which we intend to study further in the ongoing expansion cohorts, and the planned Phase 1b translational medicine trial and two Phase 2 studies.

- Furthermore, 13 of the 52 patients have shown stable disease with durations between two and 16 cycles of treatment, and at various dose levels. This includes 10 HCC patients with stable disease varying between 2 and 7 months, and one SCLC patient who started MRX34 on the QD × 5 schedule in the 50 mg/m$^2$ dose cohort as a fourth line therapy and who achieved long term stable disease for 16 cycles before disease progression.

Aside from several patients who achieved stable disease, no meaningful clinical response was observed in the 23 patients enrolled with hematological malignancies.

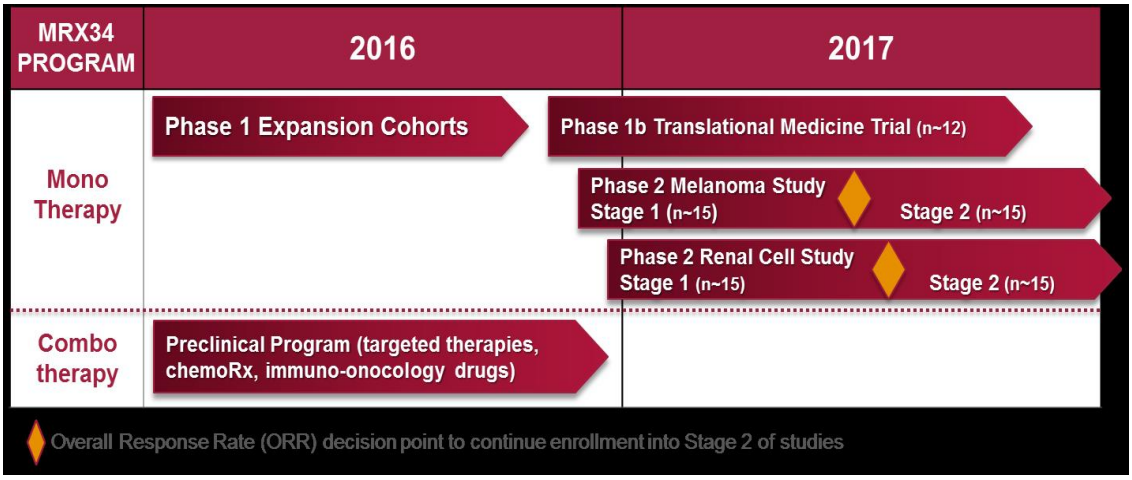
***Expansion Phase (Ongoing)***

After completion of the dose-escalation phase in the QD × 5 dosing schedule in late 2015, we initiated several tumor-specific expansion cohorts in our ongoing Phase 1 study, including primary liver cancer, melanoma, small cell and non-small cell lung cancer, lymphoma and multiple myeloma. Objectives of the expansion cohorts are to gain further clinical Phase 1 experience with MRX34 and where possible obtain additional tumor biopsy samples for pharmacodynamic evaluations. Although we initially planned to enroll approximately 80 to 100 patients in the Phase 1 expansion cohort, we now expect to enroll approximately 33 patients across these cohorts prior to initiating our Phase 1b translational medicine study and the Phase 2 studies in melanoma and RCC (to be discussed below).

We plan to provide a clinical update on the Phase 1 clinical trial mid-2016 and top-line data mid-2017.

***MRX34 Development Plan***

Following review of available clinical data from the MRX34-101 trial to date as well as consultation with oncology experts, our MRX34 development plan is set forth below.



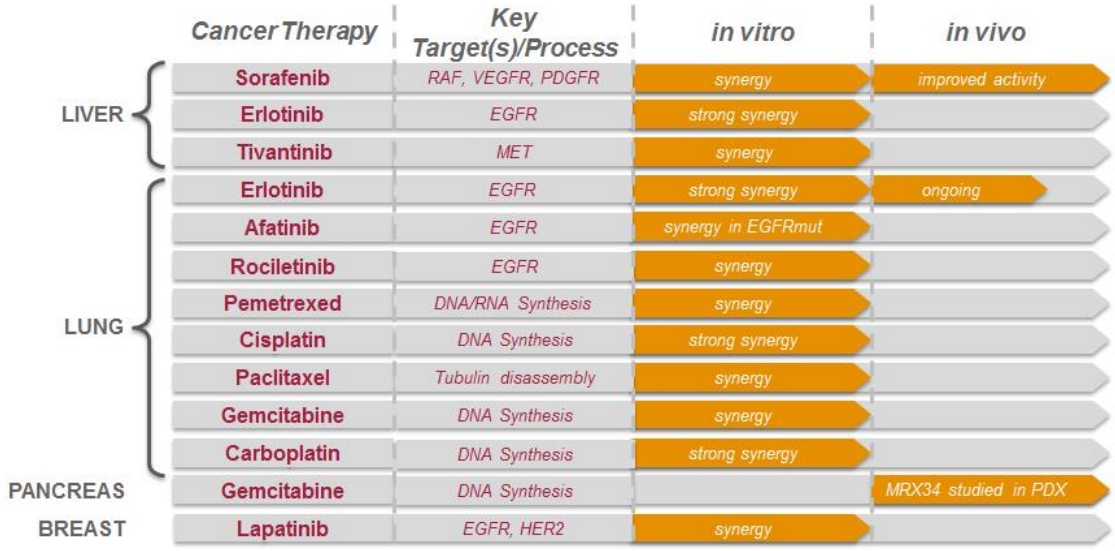

We plan to advance two Phase 2 clinical studies by the end of 2016, one study in patients with advanced malignant melanoma, and the other in patients with advanced RCC. We intend for the design of the two studies to be based on the Simon's two-stage Minimax design (Simon, R. minimax two-stage designs for phase II clinical trials, *Control Clin Trials*, 1989, 10:1). For the Phase 2 study in melanoma, the Company intends to submit the study protocol to its open IND for MRX34 at the Food and Drug Administration (FDA) as part of the normal course of study start up. For the renal cell carcinoma study, which will be reviewed by a separate group within the Oncology Drug Review division at the FDA, we intend to request a pre-IND meeting with this division and incorporate any advice the FDA might provide in a new IND that we expect to submit to the FDA for MRX34 in that indication later in 2016. We anticipate enrolling approximately 30 patients in each study and we plan to provide a clinical update on these studies in the second half of 2017.

We further intend to initiate a translational medicine trial in late 2016 with serial patient tumor biopsies. General study objectives will be to develop deeper insights into the mechanism of action of MRX34 in melanoma patients, including pharmacodynamic biomarkers related to therapeutic activity and clinical response.

Although we have observed a prolonged confirmed partial response and several prolonged stable diseases in 42 patients with HCC enrolled as of December 31, 2015, we do not plan to pursue HCC as monotherapy at this point in time. This decision was based on both encouraging responses observed in acral melanoma and RCC as well as the rapidly changing treatment paradigm, including the development of immune-oncology agents for HCC.

***Combination Therapy for MRX34***

Use of combination therapy is common practice in the treatment of many different cancer types. Based on encouraging in vitro data, which demonstrate significant synergy between a mimic of miR-34 and either targeted therapies or standard chemotherapies. We have initiated a program to evaluate MRX34 in combination with various standard of care and investigational cancer drugs. In September 2015 we entered into a grant contract with CPRIT pursuant to which we agreed to conduct preclinical and clinical testing of certain combination therapies. 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.




The key insights developed from these introductory studies on the synergistic effects of drug combination form the basis for our ongoing and planned *in vivo* studies. We are testing the therapeutic benefit of combining MRX34 with erlotonib and the chemotoxic drug cisplatin in relevant mouse models of NSCLC. We expect that positive results from these preclinical studies, if any, may inform progression toward clinical testing. Given our recent preclinical data suggesting that MRX34 may also inhibit PD-L1 and tumor immune evasion, we also intend to explore the utility of miR-34 mimics in combination with other immuno-oncology therapies.

**Other Preclinical Product Candidates**

Through execution of our *in silico*, *in vitro* and *in vivo* analysis of multiple tumor suppressor microRNAs we have prioritized a pipeline of candidate molecules for further validation toward clinical candidate nomination. Each of these candidates is being studied for therapeutic potential in specific cancer indications to expand our oncology portfolio, as set forth in the table below:

| MicroRNA PROGRAM | KEY ONCOGENE TARGETS | PATHWAYS | CANCER INDICATION |
|---|---|---|---|
| **miR-215** | BCL2, BMI1, DHFR, IGF, IGFR1, MDM2, PIM1, WNK1, XIAP, ZEB1/2 | Cell Cycle, Apoptosis, DNA Repair, EMT | Esophageal, Kidney, Multiple Myeloma |
| **miR-101** | MYCN, EZH2, ERK2, FOS, MCL1, COX2, DNMT3A, VEGF, MET, ZEB1/2 | Angiogenesis, Cell Cycle, Apoptosis, EMT, Inflammation | Bladder, Gastric, Lung, Ovarian |
| **miR-16** | BCL2, VEGF-A, Cyclin-D1, HMGA1, FGFR1, CDK6, BMI1 | Apoptosis, Autophagy, Angiogenesis, EMT, Cell Cycle | Chronic Lymphocytic Leukemia, Lymphoma |
| **let-7** | RAS, MYC, HMGA2, TGFBR1,MYCN, Cyclin D2, IL6, ITGB3 | Cell Cycle, Angiogenesis, Cancer Stem Cell, EMT | Prostate, Pancreatic, Melanoma |

We are continuing preclinical *in vitro* and *in vivo* studies in 2016 to support selection of a second microRNA from our pipeline for therapeutic development. We expect to complete IND-enabling toxicology studies and submit an IND application late 2017.

**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 December 31, 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 issued, 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 a licensee under a patent family controlled by Rosetta Genomics covering certain therapeutic applications for microRNA 34a, such license being exclusive for MRX34. The licensed patents are jointly owned by YEDA Research and Development Company Ltd., the commercial arm of the Weizmann Institute of Science, and Rosetta. The license includes both U.S. and European patents and patent applications, all of which are expected to expire in approximately 2028.

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.

**Strategic Partnerships and Licenses**

***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 "*Yale University*."

***Marina Biotech, Inc.***

In December 2011, we entered into a license agreement with Marina Biotech, Inc. (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. In August 2015, we also entered into a side letter to the license agreement, under which we exercised our right to select an additional specific microRNA, in exchange for the payment of a specified selection fee 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 and as consideration for the inclusion within the license of the four 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 $4.0 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 for each optioned microRNA compound covered by such sublicense, we are required to pay a specific lump-sum payment representing the remainder of the selection fee for the inclusion of such microRNA compound within the scope of the license agreement,

as well as 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 University (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 miR-34 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. 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.

***Rosetta Genomics***

In December 2015, we entered into an agreement with Rosetta Genomics Ltd. ("Rosetta"), in-licensing certain patents controlled by Rosetta covering certain therapeutic applications for microRNA 34a. The licensed patents are jointly owned by YEDA Research and Development Company Ltd., the commercial arm of the Weizmann Institute of Science, and Rosetta. The license grants to Mirna certain non-assignable, non-transferable, worldwide rights in connection with the development and commercialization of products that relate to the tumor suppressor microRNA miR-34 (Products), and is exclusive with respect to MRX34, the Company's lead product candidate.

The License Agreement included an up-front, non-refundable payment to Rosetta of $1.6 million. It also includes obligations to pay low single-digit royalties on net sales of Products as well as royalties on sublicense revenues. Certain development and regulatory milestone payments may also be payable in connection with certain Products that relate to the TP53 gene.

The License Agreement ends on the date on which no patent applications comprised within the Licensed Patents are pending and all issued Licensed Patents have expired. We have the right to terminate the agreement without cause upon 120 days' written notice to Rosetta, subject to certain conditions, including payment of an early termination fee ranging from $2.0 million to $3.5 million. The License Agreement may also be terminated by Rosetta, with written notice, of the Company's uncured material breach, insolvency, bankruptcy or general assignment for the benefit of the creditors.

The License Agreement also includes customary provisions regarding, among other things, representations and warranties, recordkeeping, intellectual property, confidentiality, limitation of liability, indemnification, and dispute resolution.

***CPRIT***

In August 2010, we entered into a grant contract with the Cancer Prevention and Research Institute of Texas (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.

On September 1, 2015, we entered into a new grant contract with CPRIT in connection with an approximately $16.8 million award, subject to extension by mutual agreement by us and CPRIT. In October 2015, concurrent with our IPO, we realized this 2015 award in the form of an agreement by CPRIT to purchase approximately $16.8 million of shares of our common stock in a private placement. In contrast to our 2010 award, this 2015 award does not include any royalty obligation upon commercialization of our product candidates, nor are we required to repay the grant proceeds under specified circumstances. Pursuant to this grant contract, we will conduct preclinical and clinical development of certain combination therapy approaches for lung or liver cancer involving our lead product candidate, MRX34. If, at any time during the term of the grant contract, we determine that the project provided for by the grant contract is no longer commercially feasible for us, then we and CPRIT are required to consult in order to reallocate the remaining unspent budget for the project to another oncology project in our product candidate pipeline.

***Polymun Scientific Immunbiologische Forschung GmbH***

In November 2012, we entered into a supply agreement with Polymun Scientific Immunbiologische Forschung GmbH (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.

**MRX34 Market Opportunities**

Because each microRNA regulates a unique set of genes, we believe that the selection of microRNA-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 microRNA-based therapies might be used in combination with one another to further maximize potency and drug development opportunities. Several indications of high unmet need currently included in our MRX34 development program are summarized below.

***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 World Health Organization (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. Keytruda® (Pembrolizumab) and Opdivo® (Nivolumab) are FDA-approved drugs that target PD-1. Yervoy® (Ipilimumab) 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.

***Renal Cell Carcinoma (RCC)***

RCC is a type of kidney cancer that is asymptomatic in its initial stages, and as a result, is often at advanced stages of the disease by the time it is discovered. RCC is the most common type of kidney cancer in adults in the world, accounting for approximately 90% of all cases in adults. The WHO estimates approximately 347,000 cases of kidney cancer occurred in 2012 worldwide. The American Cancer Society (ACS) estimates approximately 62,700 new diagnoses of, and approximately 14,240 deaths from, kidney cancer in the United States in 2016, with a five-year survival rate for patients diagnosed with advanced kidney cancer of approximately 8%. The most commonly used treatments for kidney cancer are various forms of targeted therapies, including tyrosine kinase inhibitors, or immunotherapy. Opdivo® (Nivolumab), an inhibitor of PD-1/PD-L1 pathways, was approved by the FDA in late 2015 for the treatment of RCC in patients who have received prior anti-angiogenic therapy. The U.S. approval was based on data from CheckMate -025, an open-label, randomized Phase 3 study which demonstrated a median overall survival benefit of 25 months compared with 19.6 months for Afinitor® (Everolimus) in patients with advanced or metastatic clear-cell RCC.

***Primary Liver Cancer (Hepatocellular Carcinoma, or HCC)***

According to the 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 Nexavar® (Sarofenib), 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. Opdivo® (Nivolumab), 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.

***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, Opdivo® (Nivolumab), 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 in combination with targeted therapies or immunotherapy agents in NSCLC.

**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 (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, 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, 2015, 2014 and 2013, we incurred $18.9 million, $10.5 million and $4.4 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 2017.

· 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.

**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. (miRagen), a privately held company based in Boulder, Colorado, announced in November 2015 initiation of a Phase 1 clinical study of MRG-201, a synthetic microRNA mimic (promiR) to microRNA-29b. The Phase 1 trial is being conducted in normal healthy volunteers and may be extended to patients suffering from cutaneous scleroderma. In March 2016, miRagen announced the initiation of Phase 1 clinical study of its anti-cancer product candidate MRG-106, a synthetic microRNA antagonist (LNA antimiR®) of microRNA-155. The Phase 1 trial is being conducted in patients suffering from cutaneous T-cell lymphoma (CTCL) of the mycosis fungoides (MF) sub-type. miRagen also has preclinical anti-miRs programs with an initial focus in cardiovascular, metabolic diseases, and neurological diseases. miRagen has entered into a partnership with Laboratoires Servier to focus on three different targets in the cardiovascular and metabolic space.

Regulus Therapeutics, Inc. (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 announced completed enrollment in 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. In December 2015, Regulus announced initiation of a Phase I clinical study by its collaboration partner, AstraZeneca, of RG-125(AZD4076), an anti-miR-103/107 oligonucleotide for the treatment of NASH in patients with type 2 diabetes/pre-diabetes. Otherprograms 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.

EnGeneIC is a privately held Australian company developing a nanocell platform for delivery of cancer therapeutics and other therapeutic molecules. In November 2014, EnGeneIC announced initiation of a Phase 1 clinical trial of its delivery system packaged with a miR-16-based microRNA mimic 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 Institutional Review Board (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 (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 (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 (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 conditionally approve the NDA, among other things, requiring 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 (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 $1 million per year for “knowing failures”), for all payments, transfers of value or ownership or investment interests not reported in an annual submission. Manufacturers must submit reports by the 90$^{th}$ 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 (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 (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 (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.

**Facilities and Services Agreement with Asuragen**

In October 2014, we amended an existing service agreement under which Asuragen provides certain services to us. These services include facilities-related services, warehouse services, shipping and receiving and other services. The term for the agreement expires in August 2016, but may be terminated earlier by either party with six months' notice.

**Employees**

As of December 31, 2015, we had 31 full-time employees, of whom two have medical degrees and four have Ph.D. degrees. Of these full-time employees, 24 employees are engaged in research and development activities and seven 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.

**About Us**

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. We completed the initial public offering of our common stock in October 2015. Our common stock is currently listed on The NASDAQ Global Market under the symbol "MIRN." We are an "emerging growth company" under the Jumpstart Our Business Startups Act of 2012, and therefore we are subject to reduced public company reporting requirements.

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 Annual Report on Form 10-K or any other filings we make with the U.S. Securities and Exchange Commission (SEC). We have included our website address in this document solely as an inactive textual reference.

**Available Information**

We make available on or through our website certain reports and amendments to those reports that we file with, or furnish to, the SEC in accordance with the Securities Exchange Act of 1934, as amended, or the Exchange Act. These include our Annual Reports on Form 10-K, our Quarterly Reports on Form 10-Q and our 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. We make this information available on or through our website free of charge as soon as reasonably practicable after we electronically file the information with, or furnish it to, the SEC. Copies of this information may be obtained at the SEC's Public Reference Room at 100 F Street, NE, Washington, D.C. 20549. Information on the operation of the Public Reference Room may be obtained by calling the SEC at 1-800-SEC-0330. The SEC maintains a website that contains reports, proxy and information statements, and other information regarding our filings, at www.sec.gov. The information on, or that can be accessed through, our website is not incorporated by reference into this document or any other filings we make with the SEC.

## ITEM 1A. *RISK FACTORS*

*Investing in our common stock involves a high degree of risk. You should consider carefully the following risks, together with all the other information in this periodic report, including our financial statements and notes thereto and "Management's Discussion and Analysis of Financial Condition and Results of Operations," before you invest in our common stock. If any of the following risks actually materializes, our operating results, financial condition and liquidity could be materially adversely affected. As a result, the trading price of our common stock could decline and you could lose part or all of your investment. Additional risks and uncertainties not presently known to us or that we currently deem immaterial also may impair our business operations.*

### Risk Factors

### 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 loss for the year ended December 31, 2015 was $25.0 million. Since inception, we have incurred net losses leading to an accumulated deficit of approximately $76.5 million as of December 31, 2015.

We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future as we expand our clinical development plan for MRX34 as a mono therapy, pursue development of MRX34 as a combination therapy, 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 many 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 expand our clinical development plan for MRX34 as a mono therapy, pursue development of MRX34 as a combination therapy, conduct research and development of other product candidates and pursue marketing approval for MRX34 in the future. 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 December 31, 2015, we had working capital of $84.6 million and cash and cash equivalents of $89.7 million. Based on our current operating plan, we believe that our available cash at such date 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 at December 31, 2015 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 further 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, private placements of preferred stock, and offerings of common 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 might apply for government and private contracts and grants in the future, we cannot assure you that we will be successful in obtaining additional grants or contracts 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 advanced stage solid cancers. We have also included in the Phase 1 clinical trial 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 further clinical proof-of-concept with MRX34 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 MRX34 Phase 1 clinical trial and the initiation of several Phase 2 studies, 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 to complete enrollment in the Phase 1 clinical trial and to initiate enrollment in a Phase 1b translational medicine study and the Phase 2 clinical trials for our lead product candidate, MRX34, 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 that is expected to complete enrollment and planned Phase 1b translational medicine study and Phase 2 clinical trials that are expected to initiate enrollment by the end of 2016, we may experience delays in these trials 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, the planned initiation of a Phase 1b translational medicine study and several Phase 2 studies, 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 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 and Phase 2 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 a limited number of 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 two suppliers for clinical supply of the drug substance for our miR-34 mimic. 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 tumors in patients to produce a therapeutic response. While we are continuing to evaluate the use of SMARTICLES in different indications, and additional delivery technologies that might enable us to target specific cancer 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 and 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 2010 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—Key Partnerships and Licenses" for a description of this 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 December 31, 2015, we had 31 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 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.

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 have increased and will continue to increase our costs significantly, as well as divert significant company resources and management attention.***

Prior to our IPO, we were not 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 operate as a public company are, and could continue to 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 have made and 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 our IPO, although if the market value of our common stock that is held by non-affiliates exceeds $700 million as of any September 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 our IPO. 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 have reviewed these submissions and have submitted our response. We are currently awaiting a response from the EPO. 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. We also are the exclusive licensee with respect to MRX34 of US 9,006,206, which relates to use of miR-34 to treat a cancer associated with p53, and EP2126078, which relates to treatment of certain cancers that are also p53 negative. Both US 9,006,206 and EP 2126078 are co-owned by Rosetta Genomics and Yeda Research & Development. 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, including MRX34, as planned, absent such a license, which may not be available to us on commercially reasonable terms, or at all.

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, including any patent rights related to miR-34, 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, including MRX34, 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, the University of Zurich, and Rosetta Genomics.

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—Key Partnerships and Licenses" 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, the University of Zurich and Rosetta Genomics.

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 32 months of our Phase 1 clinical trial, most of the 122 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. Two treatment-related deaths 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 75 patients in the QD × 5 dosing cohort, capillary leak syndrome, delirium or altered mental status, and bleeding in silent or asymptomatic HCC brain metastasis, each of which occurred in two patients, and elevation of liver enzymes, fever, and thrombocytopenia, which occurred in four 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 42 patients with primary liver cancer treated with escalating doses of MRX34, one patient in 70 mg/ $m^2$ dose cohort in BIW schedule achieved confirmed partial response. Of the two acral melanoma patients enrolled in the study, one patient enrolled in the 110 mg/ $m^2$ dose cohort on the QD × 5 schedule achieved a confirmed partial response. Of the two metastatic renal cell carcinoma patients enrolled in the study, one patient enrolled in the 110 mg/ $m^2$ dose cohort on the QD × 5 schedule achieved a confirmed partial response. 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

***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 trading price of our common stock could be highly volatile and could be subject to wide fluctuations in response to various factors, some of which are beyond our control. These factors include those discussed in this "Risk Factors" section of this document and others such as:

- 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 are able to exert significant control over matters subject to stockholder approval.***

Based on the beneficial ownership of our common stock as of December 31, 2015, our officers and directors, together with holders of 5% or more of our outstanding common stock and their respective affiliates, beneficially own approximately 74.8% of our common stock. Accordingly, these stockholders 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 periodic report 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. Of the 20,830,555 shares of common stock outstanding at March 15, 2016, only the shares of common stock sold by us in the IPO, plus any shares sold upon exercise of the underwriters' option to purchase additional shares of common stock, are currently freely tradable without restriction, unless held by our affiliates or otherwise subject to the lock-up agreements pertaining to the IPO, in the public market.

The lock-up agreements pertaining to the IPO will expire on March 28, 2016. After the lock-up agreements expire, an additional approximately 13,875,593 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 Stock Plan, as of December 31, 2015, and including the initial reserves under our 2015 Equity Incentive Award Plan, or 2015 Plan, and Employee Stock Purchase Plan, or ESPP, approximately 2.6 million shares of common stock that are either subject to outstanding options, outstanding but subject to vesting, or reserved for future issuance under the 2008 Stock Plan, 2015 Plan or ESPP 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 filed a registration statement permitting certain shares of common stock issued in the future pursuant to the 2008 Plan, 2015 Plan and ESPP 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 and ESPP also contain provisions for the annual increase of the number of shares reserved for issuance under such plans, which shares we also intend to register. If the shares we may issue from time to time under the 2008 Stock Plan, 2015 Plan or ESPP 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 13.9 million shares of our common stock at December 31, 2015 are entitled to rights with respect to the registration of their shares under the Securities Act, subject to the lock-up agreements described above. 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.

***An active, liquid and orderly market for our common stock may not develop.***

Prior to our IPO in October 2015, there had been no public market for our common stock, and an active public market for our shares may not develop or be sustained. Further, certain of our existing institutional investors, including investors affiliated with certain of our directors, purchased approximately 2.4 million shares of common stock in our IPO and consequently fewer shares may be actively traded in the public market because these stockholders are restricted from selling the shares by restrictions under applicable securities laws and the lock-up agreements entered into in connection with our IPO, which would reduce the liquidity of the market for our common stock. The lack of an active market may impair our stockholders' ability to sell their shares at the time they wish to sell them or at a price that they consider reasonable. An inactive market may also impair our ability to raise capital by selling shares and may impair our ability to acquire other businesses or technologies or in-license new product candidates using our shares as consideration.

***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 to determine how to use the net proceeds of our IPO and the concurrent private placement and may not use them effectively.***

Our management has broad discretion over the use of the net proceeds from our IPO and the concurrent private placement described in the Prospectus. 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 our IPO and the concurrent private placement. 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 our IPO and the concurrent private placement 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 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 $2.5 million at December 31, 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 periodic report.

**ITEM 1B.** ***UNRESOLVED STAFF COMMENTS***

None.

**ITEM 2.** ***PROPERTIES***

Our corporate headquarters is located in Austin, Texas. In October 2014, we entered into a sublease agreement with Asuragen under which we share space with Asuragen. 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.

**ITEM 3.** ***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.

**ITEM 4.** ***MINE SAFETY DISCLOSURES***

Not applicable.

**PART II**

**ITEM 5.** ***MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS, AND ISSUER PURCHASES OF EQUITY SECURITIES***

**Price Range of Common Stock**

Our common stock has been publicly traded on The NASDAQ Stock Market LLC, or NASDAQ, under the symbol "MIRN" since the initial public offering, or IPO, of our common stock on October 1, 2015. Prior to that time, there was no public market for our common stock. The following table sets forth on a per share basis, for the periods indicated, the low and high sale prices of our common stock as reported by NASDAQ.

| | High | Low |
|---|---|---|
| **Year Ended December 31, 2015** | | |
| Fourth quarter (beginning October 1) | $ 11.01 | $ 5.54 |

**Holders of Record**

At March 15, 2016, there were approximately 178 stockholders of record of our common stock, and the closing price per share of our common stock was $4.74. Since many of our shares of common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of stockholders represented by these record holders.

**Dividends**

We have never declared or paid cash dividends on our capital stock. However, we issued shares of common stock to the holders of Series C convertible preferred stock and Series D convertible preferred stock as part of our IPO under the terms of our then-effective certificate of incorporation as a result of an accruing paid-in-kind dividend.

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.

**Stock Performance Graph**

The following graph illustrates a comparison of the total cumulative stockholder return on our common stock since September 30, 2015, which is the date our common stock first began trading on NASDAQ, to two indices: the NASDAQ Composite Index and the NASDAQ Biotechnology Index. The stockholder return shown in the graph below is not necessarily indicative of future performance, and we do not make or endorse any predictions as to future stockholder returns. This graph shall not be deemed "soliciting material" or be deemed "filed" for purposes of Section 18 of the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

**Recent Sales of Unregistered Securities**

The following list sets forth information as to all securities we have sold from January 1, 2015 through December 31, 2015 which were not registered under the Securities Act.

1. In March 2015, we issued an aggregate of 3,872,278 shares of our Series D convertible preferred stock at a price per share of $9.165 per share for aggregate gross consideration of $35.5 million to 17 accredited investors.

2. In April 2015, we issued an aggregate of 687,397 shares of our Series D convertible preferred stock at a price per share of $9.165 per share for aggregate gross consideration of $6.3 million to two accredited investors.

3. Prior to filing our registration statement on Form S-8 in October 2015, 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 328,101 shares of common stock, at a weighted-average average exercise price of $6.45 per share. Of these, no options were cancelled without being exercised during this time period.

4. Prior to filing our registration statement on Form S-8 in October 2015, we granted stock options and stock awards to employees, directors and consultants under our 2015 Equity Incentive Award Plan, as amended, covering an aggregate of 727,981 shares of common stock, at a weighted-average average exercise price of $7.00 per share. Of these, no options were cancelled without being exercised during this time period.

5. Prior to filing our registration statement on Form S-8 in October 2015, we sold an aggregate of 28,516 shares of common stock to employees, directors and consultants for cash consideration in the aggregate amount of approximately $67,000 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) and (2) 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 (3) through (5) 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.

In addition, on October 5, 2015, we issued and sold 2,395,010 shares of our common stock to the Cancer Prevention and Research Institute of Texas in a private placement at a price of $7.00 per share for an aggregate offering price of approximately $16.8 million. We claimed exemption from registration under the Securities Act for the sale and issuance of securities in this transaction by virtue of Section 4(2) and/or Regulation D promulgated thereunder as a transaction not involving any public offering. We claimed such exemption on the basis that (a) the purchaser represented that it was an accredited investor and intended to acquire the securities for investment only and not with a view to the distribution thereof and that it 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 securities issued in the transaction.

**Use of Proceeds**

On September 30, 2015, the U.S. Securities and Exchange Commission declared effective our registration statement on Form S-1 (File No. 333-206544), as amended, filed in connection with our initial public offering. Pursuant to the registration statement, we registered the offer and sale of 6,250,000 shares of our common stock with an aggregate offering price of approximately $43.7 million, as well as the issuance of an additional 704,962 shares of our common stock pursuant to the underwriters' partial exercise of their option to purchase additional shares, for an aggregate offering price of approximately $4.9 million. In total, we issued and sold an aggregate of 6,954,962 shares of our common stock at a price to the public of $7.00 per share for an aggregate offering price of approximately $48.7 million. The managing underwriters of the offering were Citigroup, Leerink Partners, Oppenheimer & Co. and Cantor Fitzgerald & Co. After deducting underwriting discounts and commissions and offering expenses paid or payable by us of $5.0 million, the aggregate net proceeds from the offering were $43.7 million. No offering expenses were paid or are payable, directly or indirectly, to our directors or officers, to persons owning 10% or more of any class of our equity securities or to any of our affiliates.

The net proceeds from the initial public offering have been invested in a variety of capital preservation investments, including short-term, investment-grade, interest-bearing instruments and U.S. government securities. There has been no material change in the expected use of the net proceeds from our initial public offering as described in our registration statement on Form S-1.

**Purchases of Equity Securities by the Issuer and Affiliated Purchasers**

None.

**ITEM 6. *SELECTED FINANCIAL DATA***

The following selected statement of operations data for the years ended December 31, 2013, 2014 and 2015, and the selected balance sheet data at December 31, 2013, 2014 and 2015 have been derived from our audited financial statements included elsewhere in this Annual Report on Form 10-K. Our historical results for any prior period are not necessarily indicative of results to be expected in any future period.

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 Annual Report on Form 10-K and with our financial statements and notes thereto included elsewhere in this Annual Report on Form 10-K.

| | Year Ended December 31, | | | |
|---|---|---|---|---|
| | 2015 | 2014 | 2013 | 2012 |
| | (in thousands, except share and per share data) | | | |
| **Statement of Operations Data:** | | | | |
| Operating expenses: | | | | |
| Research and development | $ 18,947 | $ 10,545 | $ 4,391 | $ 2,742 |
| General and administrative | 6,080 | 3,369 | 2,384 | 1,562 |
| Write-off of offering expenses | — | 1,920 | — | |
| Total operating expenses | 25,027 | 15,834 | 6,775 | 4,304 |
| Other income (expense): | | | | |
| Change in fair value of option liability | — | — | 339 | — |
| Gain on Extinguishment of Note Payable | — | — | — | 1,001 |
| Interest income (expense) | 44 | — | — | (355) |
| Net loss | $ (24,983) | $(15,834) | $ (6,436) | $ (3,658) |
| Less: Accretion and dividends on convertible preferred stock | (4,320) | (2,824) | (2,324) | (6,142) |
| Net loss attributable to common stockholders | $ (29,303) | $(18,658) | $ (8,760) | $ (9,800) |
| Net loss per share attributable to common stockholders, basic and diluted | $ 5.85 | $(291.00) | $(4,408.65) | $(5,603.23) |
| Common shares used to compute basic and diluted net loss per share attributable to common stockholders | 5,010,323 | 64,131 | 1,987 | 1,749 |

| | At December 31, | | | |
|---|---|---|---|---|
| | 2015 | 2014 | 2013 | 2012 |
| | (in thousands) | | | |
| **Balance Sheet Data:** | | | | |
| Cash and cash equivalents | $ 89,713 | $ 9,319 | $ 23,182 | $ 13,266 |
| Total assets | 90,917 | 9,825 | 23,684 | 13,706 |
| Total liabilities | 5,901 | 2,499 | 1,145 | 4,364 |
| Convertible preferred stock | — | 55,277 | 52,453 | 33,710 |
| Common stock | 21 | — | — | — |
| Additional paid-in capital | 161,518 | — | 890 | — |
| Accumulated deficit | (76,523) | (47,951) | (30,804) | (24,368) |
| Total stockholders' (deficit) equity | 85,016 | (47,951) | (29,914) | (24,368) |

**ITEM 7. *MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS***

*You should read the following management's discussion and analysis of our financial condition and results together with the section entitled "Selected Financial Data" and our financial statements and related notes included elsewhere in this Annual Report on Form 10-K. This discussion and other parts of this Annual Report 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 in Part I Item IA.*

**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 demonstrated clinical proof of concept 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, offerings of our common stock, and support from our former parent company, Asuragen. From our inception through December 31, 2015, we have raised an aggregate of approximately $167.3 million to fund our operations, of which approximately $89.9 million was from the issuance of preferred stock for cash and assets, $48.7 million from a public offering of our common stock, $16.8 million from a private placement of our common stock and $11.9 million was from federal and state grants.

Since our inception, we have incurred significant operating losses. Our net loss was $25.0 million for the year ended December 31, 2015. At December 31, 2015, we had an accumulated deficit of $76.5 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.

***Fiscal Year 2015 and Other Recent Highlights***

In March and April of 2015, we issued an aggregate of 4,559,675 shares of our Series D convertible preferred stock at a price per share of $9.17. We received aggregate gross consideration of approximately $41.8 million.

On September 30, 2015, our registration statement on Form S-1 relating to our initial public offering ("IPO") of common stock became effective. Our IPO closed on October 6, 2015 and we issued and sold 6,250,000 shares of our common stock at an initial price of $7.00 per share of common stock. On October 9, 2015, we closed the offering of an additional 704,962 shares issued pursuant to the partial exercise by the underwriters of their over-allotment option. We received cash proceeds of approximately $43.7 million from our IPO, net of underwriting discounts and commissions and offering costs paid by us.

On October 5, 2015, we issued 2,395,010 shares of common stock in a private placement at a price of $7.00 per share. Net proceeds from the private placement were approximately $16.6 million, net of estimated offering costs payable by us.

**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.

These 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.

The Company records upfront and milestone payments made to third parties under licensing arrangements as an expense. Upfront payments are recorded when incurred and milestone payments are recorded when the specific milestone has been achieved.

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 and 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 December 31, 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. In addition, in September 2015, we entered into a new grant contract with CPRIT in connection with an award of approximately $16.8 million in the form of a concurrent private placement of shares of our common stock at a price per share equal to the IPO price of $7.00.

At December 31, 2015, we had one National Institutes of Health, or NIH, grant ongoing with approximately $59,000 incurred and approximately $166,000 still to be incurred on the grant.

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.

***Recent Accounting Pronouncements***

For recent accounting pronouncements see Note 2. *Summary of Significant Accounting Policies* of Notes to Consolidated Financial Statements in Part II, Item 8 of this Report.

**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 stock-based compensation and clinical trial and pre-clinical study accruals. 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 elsewhere in this Annual Report on Form 10-K, 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 several 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 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.

***Clinical Trial and Pre-Clinical Study Accruals***

We estimate pre-clinical study and clinical trial expenses pursuant to contracts with research institutions and contract research organizations that conduct and manage preclinical studies and clinical trials on our behalf based on estimates of the level of service performed and the underlying agreement. Further, we accrue expenses related to clinical

trials based on the level of patient enrollment and other activities according to the related agreements. We monitor patient enrollment levels and other activities to the extent reasonably possible and adjust estimates accordingly.

**Results of Operations**

***Comparison of years ended December 31, 2015 and 2014:***

| | Year Ended December 31, | | Dollar Change | % Change |
|---|---|---|---|---|
| | 2015 | 2014 | | |
| | (in thousands) | | | |
| **Statement of operations data:** | | | | |
| Operating expenses: | | | | |
| Research and development, before grant reimbursement | $19,405 | $ 10,626 | $ 8,779 | 82.6 % |
| Less grant reimbursement | (458) | (81) | (377) | 465.4 % |
| Research and development | 18,947 | 10,545 | 8,402 | 79.7 % |
| General and administrative | 6,080 | 3,369 | 2,711 | 80.5 % |
| Write off of offering expenses | — | 1,920 | (1,920) | (100.0)% |
| Interest (income) | (44) | — | (44) | 100.0 % |
| Net loss | $24,983 | $ 15,834 | $ 9,149 | 57.8 % |

*Research and Development Expenses*

Research and development spending, prior to the offset of grant reimbursements, was $19.4 million for the year ended December 31, 2015, which was an increase of approximately $8.8 million, or 83%, compared to research and development spending, prior to the offset of grant reimbursements, of $10.6 million for the year ended December 31, 2014. After giving effect to the offset of grant reimbursements, research and development expenses were $18.9 million for the year ended December 31, 2015, which was an increase of $8.4 million, or 80%, compared to research and development expenses of approximately $10.5 million for the year ended December 31, 2014. The increase in the year ended December 31, 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 personnel costs due to increases in personnel and compensation, and increased intellectual property and licensing costs.

Research and development spending was partially offset by approximately $458,000 of grant reimbursements for the year ended December 31, 2015, compared to reimbursement of approximately $81,000 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 $6.1 million for the year ended December 31, 2015, which was an increase of approximately $2.7 million, or 81%, compared to the same period in 2014. General and administrative expenses increased primarily due to increased personnel related expenses, higher outside professional costs, consulting and recruiting costs.

*Write Off of Offering Costs*

The Company deferred costs incurred for a planned initial public offering through August 2014, which included legal, audit, tax and other professional fees. The IPO was delayed and, as a result, the Company recorded a write-off of deferred offering costs of $1.9 million during the year ended December 31, 2014. Deferred offering costs incurred through December 31, 2015 have been recorded as a reduction of proceeds from a concurrent private placement and the IPO.

***Comparison of year ended December 31, 2014 and 2013:***

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

*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 $3.9 million of grant proceeds received for the year ended December 31, 2013 of approximately $3.8 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 $1.9 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.

**Liquidity and Capital Resources**

***Liquidity and Capital Expenditures***

Since inception, our operations have been financed primarily through proceeds of $167.3 million to fund our operations, of which approximately $89.9 million was from the issuance of preferred stock for cash and assets, $48.7 million from a public offering of our common stock, $16.8 million from a private placement of our common stock and $11.9 million was from federal and state grants.

At December 31, 2015, we had $89.7 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.

On March 31, 2015, April 7, 2015 and April 21, 2015, we issued an aggregate of 4,559,675 shares of our Series D convertible preferred stock at a price per share of $9.17. We received aggregate gross consideration of approximately $41.8 million.

On September 30, 2015, our Form S-1 (File No. 333-206544), as amended, relating to our IPO was declared effective by the Securities and Exchange Commission, and on October 6, 2015 and on October 9, 2015, we issued an aggregate of 6,954,962 shares of common stock at an offering price of $7.00 per share.

In connection with a research grant awarded to us in September 2015, CPRIT agreed to purchase from us concurrently with our IPO in a private placement approximately $16.8 million of our common stock at a price per share equal to the IPO price of $7.00 per share. The concurrent private placement was completed on October 5, 2015, with the issuance of 2,935,010 shares of the Company's common stock.

We believe that our existing cash and cash equivalents as of December 31, 2015, is 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 year ended December 31, 2015 and 2014:

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2015 | 2014 | 2013 |
| | (in thousands) | | |
| Net cash provided by (used in): | | | |
| Operating activities | $ (21,135) | $ (13,970) | $ (6,496) |
| Investing activities | (251) | (102) | (7) |
| Financing activities | 101,780 | 209 | 16,419 |
| Net increase (decrease) | $ 80,394 | $ (13,863) | $ 9,916 |

***Operating Activities***

Net cash used in operating activities was $21.1 million and $14.0 million for the year ended December 31, 2015 and 2014, respectively. The increase in overall spending for operating activities of approximately $7.1 million was due to increased headcount and personnel expenses, increased spending for clinical trials and intellectual property related expenses and higher license fees for 2015. The increase was partially offset by the one-time write-off of IPO offering-related costs in August 2014.

Net cash used in operating activities was $14.0 million and $6.5 million for the year ended December 31, 2014 and 2013, respectively. The increase in overall spending for operating activities of approximately $7.5 million was due to increased headcount and personnel expenses, increased spending for clinical trials and intellectual property related expenses. 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 year ended December 31, 2015, 2014, and 2013, total amounts spent on the purchase of fixed assets were approximately $313,000, $102,000, and $7,000 respectively.

***Financing Activities***

Net cash provided by financing activities was approximately $101.7 million for the year ended December 31, 2015, which was due to the offering of our Series D convertible preferred stock and our IPO and concurrent private placement. For the year ended December 31, 2014, approximately $67,000 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 the year ended December 31, 2013 net cash provided by financing

activities of $16.4 million was due to the net proceeds from the second funding round 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. Each of the services agreement and sublease agreement expires in August 2016. As of December 31, 2015, the remaining commitments for payments under the services agreement and the sublease agreement through 2016 total approximately $322,000 and $59,000, respectively. There are no further payment commitments under either agreement.

**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.

**Segment Information**

We have one primary business activity and operate as one reportable segment.

## ITEM 7A. *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 December 31, 2015, we had cash and cash equivalents of $89.7 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.

## ITEM 8. *FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA*

The following consolidated financial statements, and the related notes thereto, of Mirna Therapeutics, Inc. and the Reports of the Company’s Independent Registered Public Accounting Firm are filed as a part of this Report.

## Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders of
Mirna Therapeutics, Inc.

We have audited the accompanying balance sheets of Mirna Therapeutics, Inc. (the "Company") as of December 31, 2015 and 2014, and the related statements of operations, stockholders' equity (deficit) and cash flows for each of the three years in the period ended December 31, 2015. 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, 2015 and 2014, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2015 in conformity with U.S. generally accepted accounting principles.

/s/ Ernst & Young LLP

Austin, Texas
March 29, 2016

**MIRNA THERAPEUTICS, INC.**

**Balance Sheets**

**(in thousands, except share and per share data)**

| | December 31, 2015 | December 31, 2014 |
|---|---|---|
| **Assets** | | |
| Current Assets: | | |
| Cash and cash equivalents | $ 89,713 | $ 9,319 |
| Grant reimbursement and other receivables | 36 | 155 |
| Prepaid expenses and other current assets | 793 | 143 |
| Total current assets | 90,542 | 9,617 |
| Property and equipment, net | 375 | 116 |
| Deferred offering costs | — | 92 |
| Total assets | $ 90,917 | $ 9,825 |
| **Liabilities, Convertible Preferred Stock and Stockholders' Equity (Deficit)** | | |
| Current Liabilities: | | |
| Accounts payable | $ 3,687 | $ 871 |
| Accrued expenses | 2,214 | 1,628 |
| Total liabilities | 5,901 | 2,499 |
| Commitments and contingencies (Note 13) | | |
| Convertible preferred stock, $0.001 par value; 0 shares and 84,000,783 shares authorized at December 31, 2015 and 2014; | | |
| Series A: 3,192,083 shares designated at December 31, 2014; 0 shares and 212,754 shares issued and outstanding at December 31, 2015 and 2014, respectively; aggregate liquidation preference of $0 and $6.4 million at December 31, 2015 and 2014, respectively | — | 6,384 |
| Series B: 540,341 shares designated at December 31, 2014; 0 shares and 36,019 shares issued and outstanding at December 31, 2015 and 2014, respectively; aggregate liquidation preference of $0 and $1.5 million at December 31, 2015 and 2014, respectively | — | 1,500 |
| Series B- 1: 10,914,947 shares designated at December 31, 2014; 0 shares and 727,643 shares issued and outstanding at December 31, 2015 and 2014, respectively; aggregate liquidation preference of $0 and $7.5 million at December 31, 2015 and 2014, respectively | — | 7,498 |
| Series C: 69,353,712 shares designated at December 31, 2014; 0 shares and 4,623,523 shares issued and outstanding at December 31, 2015 and 2014, respectively; aggregate liquidation preference of $0 and $39.9 million at December 31, 2015 and 2014, respectively | — | 39,895 |
| Series D: 73,649,755 shares designated at December 31, 2014; No shares issued and outstanding at December 31, 2015 and 2014 | — | — |
| Stockholders' Equity (Deficit): | | |
| Preferred stock, $0.001 par value, 5,000,000 and 0 shares authorized at December 31, 2015 and 2014; 0 shares outstanding at December 31, 2015 and 2014 | — | — |
| Common stock, $0.001 par value; 250,000,000 shares authorized at December 31, 2015; 95,000,000 shares authorized at December 31, 2014; 20,830,555 shares issued and outstanding at December 31, 2015; 83,325 shares issued and outstanding at December 31, 2014 | 21 | — |
| Additional paid in capital | 161,518 | — |
| Accumulated deficit | (76,523) | (47,951) |
| Total stockholders' (equity) deficit | 85,016 | (47,951) |
| Total liabilities, convertible preferred stock and stockholders' (equity) deficit | $ 90,917 | $ 9,825 |

**MIRNA THERAPEUTICS, INC.**

**Statements of Operations**

**(in thousands, except share and per share data)**

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2015 | 2014 | 2013 |
| Operating expenses: | | | |
| Research and development | $ 18,947 | $ 10,545 | $ 4,391 |
| General and administrative | 6,080 | 3,369 | 2,384 |
| Write-off of offering costs | — | 1,920 | — |
| Total operating expenses | 25,027 | 15,834 | 6,775 |
| Other income: | | | |
| Change in fair value of option liability | — | — | 339 |
| Interest income | 44 | — | — |
| Total other income | 44 | — | 339 |
| Net loss | $ (24,983) | $ (15,834) | $ (6,436) |
| Less: Accretion and dividends on convertible preferred stock | (4,320) | (2,824) | (2,324) |
| Net loss attributable to common stockholders | $ (29,303) | $ (18,658) | $ (8,760) |
| Net loss per share attributable to common stockholders—basic and diluted | $ (5.85) | $ (291.00) | $ (4,408.65) |
| Common shares used to compute basic and diluted net loss per share attributable to common stockholders | 5,010,323 | 64,131 | 1,987 |

**MIRNA THERAPEUTICS, INC.**

**Statements of Stockholders' Equity (Deficit)**

**(in thousands, except share amounts)**

| | Common Stock | | Additional Paid-in | Accumulated | Total Stockholders' Equity (Deficit) |
|---|---|---|---|---|---|
| | Shares | Amount | Capital | Deficit | |
| Balance at January 1, 2013 | 1,835 | $ — | $ — | $ (24,368) | $ (24,368) |
| Exercise of stock options | 226 | — | 1 | — | 1 |
| Stock-based compensation | — | — | 163 | — | 163 |
| Reclassification of option liability | — | — | 3,050 | — | 3,050 |
| Accretion of convertible preferred stock | — | — | (831) | — | (831) |
| Series C dividends | — | — | (1,493) | — | (1,493) |
| Net loss | — | — | — | (6,436) | (6,436) |
| Balance at December 31, 2013 | 2,061 | — | 890 | (30,804) | (29,914) |
| Exercise of stock options | 80,816 | — | 209 | — | 209 |
| Issuance of common stock | 448 | — | 4 | — | 4 |
| Stock-based compensation | — | — | 408 | — | 408 |
| Series C dividends | — | — | (1,511) | (1,313) | (2,824) |
| Net loss | — | — | — | (15,834) | (15,834) |
| Balance at December 31, 2014 | 83,325 | — | — | (47,951) | (47,951) |
| Exercise of stock options | 28,516 | 1 | 66 | — | 67 |
| Stock-based compensation | — | — | 985 | — | 985 |
| Accretion of convertible preferred stock | — | — | (180) | (269) | (449) |
| Series C and Series D dividends | — | — | (551) | (3,320) | (3,871) |
| Conversion of preferred stock | 11,368,742 | 11 | 100,927 | — | 100,938 |
| Initial public offerings of common stock, net of offering costs of $5,021 | 6,954,962 | 7 | 43,657 | — | 43,664 |
| Issuance of common stock in private placement concurrently with initial public offering, net of offering costs of $149 | 2,395,010 | 2 | 16,614 | — | 16,616 |
| Net loss | — | — | — | (24,983) | (24,983) |
| Balance at December 31, 2015 | 20,830,555 | $ 21 | $ 161,518 | $ (76,523) | $ 85,016 |

**MIRNA THERAPEUTICS, INC.**

**Statements of Cash Flows**

**(in thousands)**

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2015 | 2014 | 2013 |
| **Operating activities** | | | |
| Net loss | $ (24,983) | $ (15,834) | $ (6,436) |
| Adjustment to reconcile net loss to net cash used in operating activities: | | | |
| Depreciation and amortization | 54 | 35 | 36 |
| Stock-based compensation | 985 | 408 | 163 |
| Issuance of stock for services | — | 4 | — |
| Change in fair value of option liability | — | — | (339) |
| Changes in operating assets and liabilities: | | | |
| Grant reimbursement and other receivables | 119 | 40 | 121 |
| Prepaid expenses and other current assets | (650) | (99) | 2 |
| Deferred offering costs | — | 105 | (197) |
| Other noncurrent assets | — | 17 | (17) |
| Accounts payable | 2,816 | 189 | (132) |
| Accrued expenses | 524 | 1,165 | 303 |
| Net cash used in operating activities | (21,135) | (13,970) | (6,496) |
| **Investing activities** | | | |
| Purchase of property and equipment | (251) | (102) | (7) |
| Net cash used in investing activities | (251) | (102) | (7) |
| **Financing activities** | | | |
| Proceeds from issuance of convertible preferred stock, net of issuance costs | 41,433 | — | 16,418 |
| Proceeds from the issuance of common stock, net of issuance costs | 60,280 | — | — |
| Proceeds from the exercise of stock options | 67 | 209 | 1 |
| Cash provided by financing activities | 101,780 | 209 | 16,419 |
| Net increase (decrease) in cash and cash equivalents | 80,394 | (13,863) | 9,916 |
| Cash and cash equivalents at beginning of period | 9,319 | 23,182 | 13,266 |
| Cash and cash equivalents at end of period | $ 89,713 | $ 9,319 | $ 23,182 |
| | | | |
| **Supplemental disclosure of non-cash financing activities** | | | |
| Conversion of preferred stock to common stock | $ 100,938 | $ — | $ — |

**MIRNA THERAPEUTICS, INC.**

**Notes to Financial Statements**

## 1. Organization

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.

In connection with the completion of its initial public offering (“IPO”), on October 6, 2015, the Company filed an amended and restated certificate of incorporation and bylaws, which, among other things, authorizes 250,000,000 shares of common stock and 5,000,000 shares of preferred stock.

## 2. Summary of Significant Accounting Policies

***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.

Prior to the IPO on October 6, 2015, the Company utilized 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.

Prior to its IPO, 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.

***Liquidity***

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 $89.7 million at December 31, 2015, will enable the Company to maintain its current and planned operations for the next twelve months.

***Research and development costs***

Research and development costs consist of costs we incur for our own research and development activities and for preclinical studies and clinical trials. 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. These research and development costs are expensed when incurred.

The Company records upfront and milestone payments made to third parties under licensing arrangements as an expense. Upfront payments are recorded when incurred and milestone payments are recorded when the specific milestone has been achieved.

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 incurred by the 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.

***Clinical Trial and Pre-Clinical Study Accruals***

The Company estimates pre-clinical study and clinical trial expenses pursuant to contracts with research institutions and contract research organizations that conduct and manage preclinical studies and clinical trials on the Company's behalf based on estimates of the level of service performed and the underlying agreement. Further, the Company accrues expenses related to clinical trials based on the level of patient enrollment and other activities according to the related agreements. The Company monitors patient enrollment levels and other activities to the extent reasonably possible and adjusts estimates accordingly.

***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, 2015 and 2014, 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, 2015, 2014 and 2013.

***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.

***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 December 31, 2015:

| | Level 1 | Level 2 | Level 3 | Total |
|---|---|---|---|---|
| Money market funds | $89,713 | $ — | $ — | $89,713 |
| Total | $89,713 | $ — | $ — | $89,713 |

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 |

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, 2015 and 2014, due to their short-term nature.

There have been no changes to the valuation methods during the years ended December 31, 2015 and 2014. 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, 2015 or 2014.

***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, assets are written down to their estimated fair value. The Company has not recognized any impairment charges through December 31, 2015.

***Deferred offering costs***

Deferred offering costs, which consist of direct incremental legal and professional accounting fees relating to preferred stock private placements 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.

***Convertible preferred stock***

Prior to the Company's IPO, the Company initially recorded convertible preferred stock that could have been 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 adjusted the carrying value to the redemption value at each reporting period. In the absence of retained earnings, these accretion charges were recorded against additional paid-in capital, if any, and then to accumulated deficit. Upon completing the IPO, all shares of the Company's convertible preferred stock then outstanding was converted into shares of our common stock.

***Net loss per share attributable to common stockholders***

Prior to the IPO, the Company used 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. Historically, holders of the Company's Series A, Series B, Series B-1, Series C and Series D convertible preferred stock were 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 were considered participating securities. All of the Company's outstanding preferred stock was converted to common stock in connection with the IPO in October 2015.

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, 2015, 2014, and 2013, 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.

***Recent accounting pronouncements***

In February 2016, the Financial Accounting Standards Board (FASB) issued ASU 2016-02, *Leases (Topic 842)*. The new standard requires the recognition of assets and liabilities arising from lease transactions on the balance sheet and the disclosure of key information about leasing arrangements. Accordingly, a lessee will recognize a lease asset for its right to use the underlying asset and a lease liability for the corresponding lease obligation. Both the asset and liability will initially be measured at the present value of the future minimum lease payments over the lease term. Subsequent measurement, including the presentation of expenses and cash flows, will depend on the classification of the lease as either a finance or an operating lease. Initial costs directly attributable to negotiating and arranging the lease will be included in the asset. For leases with a term of twelve months or less, a lessee can make an accounting policy election by class of underlying asset to not recognize an asset and corresponding liability. Lessees will also be required to provide additional qualitative and quantitative disclosures regarding the amount, timing and uncertainty of cash flows arising from leases. These disclosures are intended to supplement the amounts recorded in the financial statements and provide additional information about the nature of an organization's leasing activities. The new standard is effective for fiscal years beginning after December 15, 2018, and interim periods within those years, with early adoption permitted. In

transition, lessees are required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. The transition guidance also provides specific guidance for sale and leaseback transactions, build-to-suit leases and amounts previously recognized in accordance with the business combinations guidance for leases. We are currently evaluating our expected adoption method and the impact of this new standard on our financial statements.

In November 2015, the FASB issued ASU No. 2015-17, *Balance Sheet Classification of Deferred Taxes* ("ASU 2015-17"). The standard requires all deferred income tax assets and liabilities to be classified as noncurrent within an entity's consolidated balance sheet. ASU 2015-17 is effective for annual periods beginning after December 15, 2016, and interim periods within those fiscal years, with early adoption permitted. Entities are also permitted to apply the revised guidance on either a prospective or retrospective basis. The Company early adopted this guidance on a prospective basis and has classified deferred income taxes in the consolidated balance sheets as noncurrent beginning with the period ended December 31, 2015. Adoption of this guidance did not affect the historical consolidated results of operations, financial position or liquidity.

In August 2014 the FASB issued ASU 2014-15, *Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern*. The ASU is intended to define management's responsibility to evaluate whether there is substantial doubt about an organization's ability to continue as a going concern and to provide related footnote disclosures. For all entities, the ASU is effective for annual periods ending after December 15, 2016 and interim periods within annual periods beginning after December 15, 2016. We will adopt this standard in 2016.

**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 was a reimbursement grant and was terminated on January 31, 2014. The Company is obligated to make certain payments to CPRIT that survive termination. 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 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.

In September 2015, the Company entered into a new grant contract with CPRIT in connection with an award of approximately $16.8 million. This 2015 award has a three-year term, subject to extension by mutual agreement by the Company and CPRIT. However, in contrast to the Company's 2010 award, this 2015 award does not include any royalty obligation upon commercialization of the Company's product candidates, nor is the Company required to repay the grant proceeds under specified circumstances. Instead, the 2015 award is in the form of an agreement by CPRIT to purchase $16.8 million of shares of common stock of the Company in a private placement concurrent with an initial public offering, subject to certain conditions, occurring prior to December 31, 2016, at the public offering price. The private placement was completed in October 2015 with the issuance of 2,395,010 shares of the common stock at $7.00 per share.

Pursuant to the grant contract, the Company will conduct preclinical and clinical development of certain combination therapy approaches for lung or liver cancer involving the Company's lead product candidate, MRX34. If, at any time during the term of the grant contract and following the consummation of our initial public offering, the Company determines that the project provided for by the grant contract is no longer commercially feasible for it, then the Company and CPRIT are required to consult in order to reallocate the remaining unspent budget for the project to another oncology project in our product candidate pipeline.

Total government grants recognized as a reduction of research and development expenses during the years ended December 31, 2015, 2014, and 2013 were $458,000; $81,000 and $3,850,000, respectively.

**4. Property and Equipment**

Property and equipment consisted of the following (in thousands):

| | December 31, 2015 | December 31, 2014 |
|---|---|---|
| Machinery, computers and equipment | $ 687 | $ 373 |
| Leasehold improvements | 18 | 18 |
| Accumulated depreciation | (330) | (275) |
| | $ 375 | $ 116 |

Depreciation expense was $54,000, $35,000 and $36,000 in 2015, 2014 and 2013, respectively.

**5. Accrued expenses**

Accrued expenses consist of the following (in thousands):

| | December 31, 2015 | 2014 |
|---|---|---|
| Compensation and related items | $ 1,151 | $ 243 |
| Professional fees | 437 | 210 |
| Clinical trial costs | 489 | 551 |
| Drug product costs | — | 525 |
| State franchise taxes | 106 | — |
| Other | 31 | 99 |
| | $ 2,214 | $ 1,628 |

**6. Convertible 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 4,559,675 shares with gross proceeds totaling approximately $41.8 million.

In conjunction with the IPO, the Company's Series A, Series B, Series B-1, Series C and Series D preferred stock was converted into an aggregate of 10,159,614 shares of the Company's common stock on a 1-for-1 basis. In addition and in conjunction with the IPO, cumulative dividends on the Company's Series C and Series D preferred stock, which totaled approximately $8.5 million, were paid in-kind, with a total of 1,209,128 shares of common stock issued to shareholders, which were calculated by dividing the cumulative dividends earned by the offering price per share of $7.00 in the IPO.

As of December 31, 2015, the Company had no outstanding convertible preferred stock.

***Conversion***

Prior to the IPO, the Series A, Series B, Series B-1, Series C and Series D were convertible into common stock at any time at the option of the holders. The conversion price was initially set at the original issue price per share of the convertible preferred stock and was adjusted to prevent dilution for stock splits, combinations and dividends.

The Company's convertible preferred stock would 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, with minimum offering requirements. The Company's convertible preferred stock would 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***

Prior to the IPO, holders of the Company's convertible preferred stock were entitled to voting rights equal to holders of common stock. Holders of the Company's convertible preferred stock were 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 were also entitled to vote on certain matters with all Series D shares voting as a single class.

***Dividends***

Prior to the IPO and subject to certain circumstances, holders of shares of Series C and shares of Series D were 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. Such dividends were 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 and the Series D shares in connection with an initial public offering the cumulative dividends were only payable in-kind.

***Liquidation***

Prior to the IPO, 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 would receive an amount per share equal to the sum of $9.165, $7.635, $10.305, $31.59 and $19.95 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 $41.64 and $30.00 per share, respectively.

***Redemption***

Prior to the IPO, 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 would redeem the requested shares of the Series D at an amount equal to the original issue price, plus any accrued and/or declared but unpaid dividends, where the original purchase price is $9.165.

Prior to the IPO, at any time after October 22, 2017, with a written request from the majority holders of the then-outstanding Series C, the Company would 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 $7.635.

The Series A and Series B were 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 have occurred outside the Company's control and thereby trigger a "deemed liquidation" and payment of liquidation preferences. Accordingly, the Company classified convertible preferred stock outside of stockholders' deficit for all periods presented.

The Company adjusted the carrying value of the convertible preferred stock to the liquidation preferences of such shares at each reporting period end prior to the IPO. The change in carrying value of the convertible preferred stock was recorded as a charge to additional paid-capital, if any, and then to accumulated deficit.

**Conversion of Preferred Stock and Accrued Dividends**

Immediately prior to the closing of the IPO, each share of the Company's outstanding preferred stock was converted into one share of common stock. In conjunction with the conversion, cumulative dividends on the Company's Series C and Series D preferred stock were paid with in-kind in shares of common stock. The following table presents the conversion of preferred stock and accrued dividends paid in-kind into common stock on October 5, 2015:

| | Prior to Conversion | | |
|---|---|---|---|
| | Preferred Shares | Paid-in-Kind Dividend Shares | Subsequent to Conversion |
| Convertible preferred stock | | | |
| Series A | 212,754 | | — |
| Series B | 36,019 | | — |
| Series B-1 | 727,643 | | — |
| Series C | 4,623,523 | 964,667 | — |
| Series D | 4,559,675 | 244,461 | |
| Total | 10,159,614 | 1,209,128 | |
| | | | |
| Common stock | — | — | 11,368,742 |

**7. Shareholders' Equity**

***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:

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.

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, 2015, no cash dividends have been declared or paid since the Company's inception.

***Reverse Stock Split***

In September 2015, the stockholders approved a reverse stock split of the outstanding shares of the Company's common stock, Series A convertible preferred stock, Series B convertible preferred stock, Series B-1 convertible preferred stock, Series C convertible preferred stock and Series D convertible preferred stock in which every 15 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, in all share and price per share data presented in the financial statements and the notes to the financial statements.

***Offerings***

In September 2015, the Company entered into a new grant contract with Cancer Prevention and Research Institute of Texas ("CPRIT"), as discussed in Note 3, in connection with an award of approximately $16.8 million. The 2015 award is in the form of an agreement by CPRIT to purchase $16.8 million of shares of common stock of the Company in a private placement concurrent with the initial public offering of the Company's common stock. On October 5, 2015, CPRIT purchased 2,395,010 shares of the Company's common stock at $7.00 per share. Net proceeds from the private placement, after related transaction offering costs, were approximately $16.6 million.

In October 2015, the Company issued 6.25 million shares of common stock in an underwritten public offering, with a price of $7.00 per share. The underwriters purchased an additional 704,962 shares of common stock pursuant to their option to purchase additional shares. The Company received aggregate net proceeds of approximately $43.7 million in the public offering, after deducting the underwriting discounts and commissions and estimated offering expenses payable by the Company.

**8. Stock Option Plans**

*2008 Long Term Incentive Plan*

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) (the "2008 Plan") for employees and nonemployees under which an aggregate of 330,582 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 224,200 to 554,782. In March 2014, the Company's board of directors approved an increase of 115,153 shares available for grant pursuant to the 2008 Plan to 669,935. 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 391,650 shares to 1,061,585. 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.

*2015 Equity Incentive Plan*

In August 2015, the Company's board of directors approved the 2015 Equity Incentive Award Plan, (the "2015 Plan"), which was effective in connection with the pricing of the IPO on September 30, 2015. The 2015 Plan provides for the granting of 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. The 2015 Plan is the successor to the 2008 Plan and the 800,478 options outstanding in the 2008 Plan at December 31, 2015 may be transferred to the 2015 Plan if awards thereunder terminate, expire or lapse for any reason without the delivery of shares to the holder thereof. Under the 2015 Plan, 1,671,800 shares of the Company's common stock will be initially authorized and reserved for issuance, and will be added to the outstanding shares transferred from the 2008 Plan for a total of 2,472,278 authorized for grant under the 2015 Plan at December 31, 2015.

*2015 Employee Stock Purchase Plan*

In August 2015, the Company's board of directors approved the 2015 Employee Stock Purchase Plan (the "ESPP"), which was effective in connection with the pricing of the IPO on September 30, 2015. The ESPP allows eligible employees to purchase shares of the Company's common stock at a discount through payroll deductions of up to 15% of their eligible compensation, subject to any plan limitations. The ESPP generally provides for set offering periods, and at the end of each offering period, employees are able to purchase shares at 85% of the lower of the fair market value of the Company's common stock on the first trading day of the offering period or on the last trading day of the offering period. There were no sales under the ESPP as of December 31, 2015. Shares available for future purchase under the ESPP were 167,180 at December 31, 2015.

*Stock Option Activity*

The Company's stock option activity for the years ended December 31, 2015, 2014, and 2013 was as follows:

| | Number of Shares | Weighted-Average Exercise Price | Weighted-Average Contractual Life (years) |
|---|---|---|---|
| Outstanding at December 31, 2012 | 31,712 | $ 7.50 | 5.84 |
| Granted | 329,323 | 1.95 | |
| Exercised | (226) | 2.40 | |
| Forfeited/canceled | (5,976) | 3.50 | |
| Outstanding at December 31, 2013 | 354,833 | 2.40 | 8.80 |
| Granted | 234,447 | 8.10 | |
| Exercised | (80,816) | 2.40 | |
| Forfeited/canceled | (7,553) | 4.7 | |
| Outstanding at December 31, 2014 | 500,911 | 4.95 | 8.52 |
| Granted | 1,057,082 | 6.82 | |
| Exercised | (28,516) | 2.36 | |
| Forfeited/canceled | (18) | 7.50 | |
| Outstanding at December 31, 2015 | 1,529,459 | $ 6.29 | 9.00 |
| Options exercisable at December 31, 2015 | 356,661 | $ 4.56 | 7.61 |

The total intrinsic value of options exercised during the years ended December 31, 2015, 2014 and 2013 was $160,000, $383,000, and $440,000, respectively. The intrinsic value of options exercisable and total options outstanding at December 31, 2015 was $820,000 and $985,000, respectively. The total fair value of options vested during the years ended December 31, 2015, 2014 and 2013 was $858,000, $198,000 and $132,000, respectively.

*Stock Based Compensation Expense*

Total stock-based compensation expense was allocated as follows (in thousands):

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2015 | 2014 | 2013 |
| Research and development expense | $ 306 | $ 110 | $ 55 |
| General and administrative expense | 679 | 298 | 108 |
| | $ 985 | $ 408 | $ 163 |

There was approximately $5.2 million of unrecognized compensation cost related to the stock options granted under the 2015 Plan, which is expected to be amortized over the next 3.8 years. There were no restricted stock units or stock appreciation rights granted under the 2015 Plans of December 31, 2015.

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.

The assumptions used in the Black-Scholes option-pricing model for stock option grants during the years ended December 31, 2015, 2014 and 2013 are as follows:

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2015 | 2014 | 2013 |
| Expected life (in years) | 5.9 - 6.7 | 5.8 - 6.1 | 5.6 - 6.1 |
| Risk-free interest rate | 1.54% - 1.98% | 1.8% - 2.8% | 0.9% - 2.0% |
| Expected volatility | 77.5% - 84.7% | 75.3% - 85.4% | 74.7% - 76.2% |
| Expected dividend yield | — | — | — |
| Weighted-average grant date fair value per share | $ 4.73 | $ 5.40 | $ 1.95 |

No related tax benefits were recognized for the years ended December 31, 2015, 2014 or 2013.

**9. Income Taxes**

The Company recorded no provision for income taxes as of December 31, 2015 due to reported net losses since inception.

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, 2015, 2014 and 2013 (in thousands):

| | 2015 | 2014 | 2013 |
|---|---|---|---|
| Income tax benefit computed at federal statutory tax rate | $ (8,494) | $ (5,383) | $ (2,188) |
| Change in valuation allowance | 9,002 | 5,675 | 2,264 |
| General business credits | (661) | (386) | (32) |
| Change in fair value of option liability | — | — | (115) |
| Other | 153 | 94 | 71 |
| Total | $ — | $ — | $ — |

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, 2015, the valuation allowance increased by $9.0 million. Significant components of the Company's deferred tax assets and liabilities as of December 31, 2015 and 2014 are as follows (in thousands):

| | 2015 | 2014 |
|---|---|---|
| Net operating loss carryforwards | $ 19,562 | $ 12,414 |
| Depreciation and amortization | 1,207 | 507 |
| Stock-based compensation | 260 | 71 |
| Credit carryforwards | 1,147 | 444 |
| Prepaid expenses | — | (49) |
| Accrued liabilities | 264 | 30 |
| Total deferred tax assets | 22,440 | 13,417 |
| Valuation allowance | (22,440) | (13,417) |
| Net deferred tax asset | $ — | $ — |

As of December 31, 2015 and 2014, the Company had net operating loss ("NOL") carryforwards for federal income tax purposes of approximately $57.5 million and $36.5 million, respectively. As of December 31, 2015 and 2014, the Company also had available research and development tax credits for federal income tax purposes of approximately $985,000 and $405,000, respectively. If not utilized, these carryforwards expire at various dates beginning in 2028. As of December 31, 2015, the Company had state research and development tax credit carryforwards of approximately $162,000, which will begin to 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, 2015. 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, 2015 and 2014, the Company had no unrecognized tax benefits. During the years ended December 31, 2015 and 2014, the Company had no interest and penalties related to income taxes.

The Company files income tax returns in the U.S. federal and Texas jurisdictions. As of December 31, 2015, the statute of limitations for assessment by the Internal Revenue Service ("IRS") is open for the 2012 and subsequent tax years, although carryforward attributes that were generated for tax years prior to then may still be adjusted upon examination by the IRS if they either have been, or will be, used in a future period. The 2011 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.

**10. 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 have 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 $490,000, $506,000 and $908,000 for the years ended December 31, 2015, 2014 and 2013, respectively.

On October 31, 2014, the Company entered into a sublease agreement with Asuragen for use of office, laboratory and shared space. Total rent expense was approximately $89,000 and $15,000 for the year ended December 31, 2015 and 2014, respectively. 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.

**11. 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 2015, 2014 and 2013 were approximately $117,000, $91,000 and $64,000, respectively.

**12. License agreements**

***Rosetta Genomics Ltd.***

In December 2015, the Company entered into a Patent License Agreement (the "License Agreement") with Rosetta Genomics Ltd. ("Rosetta"), licensing to the Company certain patents owned or controlled by Rosetta as specified in the License Agreement. Under the License Agreement, Rosetta has granted the Company a non-assignable, non- transferable, worldwide license for certain patents in connection with the development and commercialization of products that relate to the tumor suppressor microRNA MIR-34 ("Products"). This license is exclusive with respect to Products that relate to MRX34, the Company's lead product candidate and non-exclusive for products that are not related.

Under the License Agreement, the Company paid Rosetta an up-front, non- refundable payment of $1.6 million in January 2016. The Company shall also be obligated to pay low single- digit royalties on net sales of Products, as well as royalties on sublicense revenues. Certain development and regulatory milestone payments totaling $3 million may also be payable in connection with specified types of Products, upon the achievement of certain development and/ or regulatory milestone events.

***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. In August 2015, the Company also entered into a side letter to the license agreement, under which it exercised its right to select an additional specific microRNA, in exchange for the payment of a specified selection fee payment.

The Company has cumulatively paid Marina approximately $2.1 million through December 31, 2015 in up-front and milestone payments and as consideration for the inclusion within the license of four 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 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 $4.0 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, for each optioned microRNA compound covered by such sublicense the Company is required to pay a specified lump-sum payment representing the remainder of the selection fee for the inclusion of such microRNA compound within the scope of the license agreement, as well as 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.

**13. Commitments and Contingencies**

***Shared Services Agreement***

Pursuant to a shared services agreement and sublease with Asuragen, the Company has remaining commitments for payments in 2016 of approximately $381,000 for shares services and rent under the Shared Services Agreement and Sublease Agreement with Asuragen. (see Note 10)

***Legal Contingencies***

The Company does not currently have any contingencies related to ongoing legal matters.

**14. 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, | | |
|---|---|---|---|
| | 2015 | 2014 | 2013 |
| Net loss | $ (24,983) | $ (15,834) | $ (6,436) |
| Accretion of convertible preferred stock to redemption value | (449) | — | (831) |
| Accrued dividends on convertible preferred stock | (3,871) | (2,824) | (1,493) |
| Net loss attributable to common stockholders—basic and diluted | (29,303) | (18,658) | (8,760) |
| Weighted-average number of common shares—basic and diluted | 5,010,323 | 64,131 | 1,987 |
| Net loss per share attributable to common stockholders—basic and diluted | $ (5.85) | $ (291.00) | $ (4,408.65) |

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, | | |
|---|---|---|---|
| | 2015 | 2014 | 2013 |
| Convertible preferred stock | 7,921,490 | 5,599,939 | 5,599,939 |
| Stock options | 1,529,459 | 500,911 | 354,834 |
| | 9,450,949 | 6,100,850 | 5,954,773 |

**15. Selected Quarterly Data (unaudited)**

The following table contains quarterly financial information for 2015 and 2014. The operating results for any quarter are not necessary indicative of results for any future period.

| | 2015 Quarter Ended | | | |
|---|---|---|---|---|
| | December 31 | September 30 | June 30 | March 31 |
| Operating Expenses: | | | | |
| Research and Development | $ 6,363 | $ 4,683 | $ 4,499 | $ 3,402 |
| General and Administrative | 2,462 | 1,556 | 1,185 | 877 |
| Total operating expenses | 8,825 | 6,239 | 5,684 | 4,279 |
| Other (income) | (36) | (8) | — | — |
| Net loss | (8,789) | (6,231) | (5,684) | (4,279) |
| Net loss attributable to common stockholders | (8,890) | (7,785) | (7,229) | (5,397) |

| | 2014 Quarter Ended | | | |
|---|---|---|---|---|
| | December 31 | September 30 | June 30 | March 31 |
| Operating Expenses: | | | | |
| Research and Development | $ 3,501 | $ 2,788 | $ 2,068 | $ 2,188 |
| General and Administrative | 877 | 715 | 929 | 848 |
| Write-off of offering costs | — | 1,920 | — | — |
| Total operating expenses | 4,378 | 5,423 | 2,997 | 3,036 |
| Other (income) | — | — | — | — |
| Net loss | (4,378) | (5,423) | (2,997) | (3,036) |
| Net loss attributable to common stockholders | (5,090) | (6,135) | (3,701) | (3,732) |

**ITEM 9.** ***CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE***

None.

**ITEM 9A.** ***CONTROLS AND PROCEDURES***

**Evaluation of Disclosure Controls and Procedures**

The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act refers to controls and procedures that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and our management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Our disclosure controls and procedures are designed to provide reasonable assurance of achieving their control objectives.

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2015, the end of the period covered by this Annual Report on Form 10-K. Based upon such evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of such date.

**Management's Annual Report on Internal Control Over Financial Reporting**

This Annual Report on Form 10-K does not include a report of management's assessment regarding internal control over financial reporting or an attestation report of the Company's independent registered public accounting firm due to a transition period established by the rules of the SEC for newly public companies.

**Changes in Internal Control over Financial Reporting**

There was no change in our internal control over financial reporting that occurred during the period covered by this Annual Report on Form 10-K that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

**ITEM 9B.** ***OTHER INFORMATION***

None.

## PART III

### ITEM 10. *DIRECTORS, EXECUTIVE OFFICERS, AND CORPORATE GOVERNANCE*

The information required by this item is incorporated by reference from the applicable information set forth in “Election of Directors,” “Corporate Governance,” “Executive Officers,” and “Section 16(a) Beneficial Ownership Reporting Compliance” which will be included in our definitive Proxy Statement for our 2016 Annual Meeting of Stockholders to be filed with the SEC.

### ITEM 11. *EXECUTIVE COMPENSATION*

The information required by this item is incorporated by reference from the applicable information set forth in “Corporate Governance,” “Non-Employee Director Compensation” and “Executive Compensation” which will be included in our definitive Proxy Statement for our 2016 Annual Meeting of Stockholders to be filed with the SEC.

### ITEM 12. *SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS*

The information required by this item is incorporated by reference from the applicable information set forth in “Security Ownership of Certain Beneficial Owners and Management” and “Equity Plan Compensation Information” which will be included in our definitive Proxy Statement for our 2016 Annual Meeting of Stockholders to be filed with the SEC.

### ITEM 13. *CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE*

The information required by this item is incorporated by reference from the applicable information set forth in “Certain Relationships and Related Party Transactions” and “Corporate Governance” which will be included in our definitive Proxy Statement for our 2016 Annual Meeting of Stockholders to be filed with the SEC.

### ITEM 14. *PRINCIPAL ACCOUNTANT FEES AND SERVICES*

The information required by this item is incorporated by reference from the applicable information set forth in “Ratification of Selection of Independent Registered Accounting Firm” which will be included in our definitive Proxy Statement for our 2016 Annual Meeting of Stockholders to be filed with the SEC.

## PART IV

**ITEM 15.** ***EXHIBITS and FINANCIAL STATEMENT SCHEDULES***

(a) The following documents are filed as part of this Annual Report on Form 10-K:

**1. Consolidated Financial Statements:**

Reference is made to the Index to consolidated financial statements of Mirna Therapeutics, Inc. under Item 8 of Part II hereof.

**2. Financial Statement Schedule:**

All schedules are omitted because they are not applicable or the amounts are immaterial or the required information is presented in the consolidated financial statements and notes thereto in Part II, Item 8 above.

**3. Exhibits**

See Exhibit Index immediately following the signature page of this Form 10-K.

## SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

**MIRNA THERAPEUTICS, INC.**
(Registrant)

Date: March 29, 2016

/s/ Paul Lammers
Paul Lammers, M.D., M.Sc.
Chief Executive Officer
(Principal Executive Officer)

Date: March 29, 2016

/s/ Alan Fuhrman
Alan Fuhrman
Chief Financial Officer
(Principal Financial Officer)

## POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints each of Paul Lammers, Alan Fuhrman and Jon Irvin his or her true and lawful attorney-in-fact and agent, with full power of substitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all amendments to this annual report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent, 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 to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or his substitutes or substitute, may lawfully do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, each of the undersigned has executed this Power of Attorney as of the date indicated opposite his/her name.

Pursuant to the requirements of the Securities Act, this report has been signed by the following persons in the capacities and on the dates indicated.

| Signature | Title | Date |
|---|---|---|
| /s/ Paul Lammers<br>Paul Lammers, M.D., M.Sc. | Director, President and Chief Executive Officer<br>(Principal Executive Officer) | March 29, 2016 |
| /s/ Alan Fuhrman<br>Alan Fuhrman | Chief Financial Officer<br>(Principal Financial Officer) | March 29, 2016 |
| /s/ Jon Irvin<br>Jon Irvin | Vice President of Finance<br>(Principal Accounting Officer) | March 29, 2016 |
| /s/ Michael Powell<br>Michael Powell, Ph.D. | Chairman of the Board | March 29, 2016 |
| /s/ Lawrence M. Alleva<br>Lawrence M. Alleva | Director | March 29, 2016 |
| /s/ Elaine V. Jones<br>Elaine V. Jones, Ph.D. | Director | March 29, 2016 |
| /s/ Edward Mathers<br>Edward Mathers | Director | March 29, 2016 |
| /s/ Clay Siegall<br>Clay Siegall, Ph.D. | Director | March 29, 2016 |
| /s/ Matthew Winkler<br>Matthew Winkler, Ph.D. | Director | March 29, 2016 |
| /s/ Peter Greenleaf<br>Peter Greenleaf | Director | March 29, 2016 |

## Exhibit Index

| Exhibit Number | Exhibit Description | Incorporated by Reference Form | Date | Number | Filed Herewith |
|---|---|---|---|---|---|
| 3.1 | Amended and Restated Certificate of Incorporation | 8-K | 10/06/2015 | 3.1 | |
| 3.2 | Amended and Restated Bylaws | 8-K | 10/06/2015 | 3.2 | |
| 4.1 | Reference is made to Exhibits 3.1 through 3.2. | | | | |
| 4.2 | Form of Common Stock Certificate. | S-1/A | 09/18/2015 | 4.2 | |
| 10.1 | Third Amended and Restated Investor Rights Agreement, dated as of March 31, 2015, by and among Mirna Therapeutics, Inc. and certain of its stockholders. | S-1/A | 09/11/2015 | 4.3 | |
| 10.2 | Registration Rights Agreement, dated October 5, 2015, by and between Mirna Therapeutics, Inc. and the Cancer Prevention and Research Institute of Texas. | 8-K | 10/5/2015 | 4.1 | |
| 10.3(A) | Services Agreement, dated January 1, 2013, by and between Mirna Therapeutics, Inc. and Asuragen, Inc. | S-1/A | 08/24/2015 | 10.1(A) | |
| 10.3(B) | Amendment No. 1 to the Services Agreement, dated October 31, 2014, by and between Mirna Therapeutics, Inc. and Asuragen, Inc. | S-1/A | 08/24/2015 | 10.1(B) | |
| 10.4(A)† | Cross License Agreement, dated November 3, 2009, by and between Mirna Therapeutics, Inc. and Asuragen, Inc. | S-1/A | 08/24/2015 | 10.2(A) | |
| 10.4(B)† | First Amendment to the Cross License Agreement, dated September 28, 2012, by and between Mirna Therapeutics, Inc. and Asuragen, Inc. | S-1/A | 08/24/2015 | 10.2(B) | |
| 10.5(A)† | License Agreement, dated December 22, 2011, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc. | S-1/A | 09/11/2015 | 10.3(A) | |
| 10.5(B)† | Side Letter to License Agreement, dated December 22, 2011, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc. | S-1/A | 08/24/2015 | 10.3(B) | |
| 10.5(C)† | Side Letter to License Agreement, dated November 16, 2012, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc. | S-1/A | 08/24/2015 | 10.3(C) | |
| 10.5(D)† | Amendment No. 1 to License Agreement, dated December 27, 2013, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc. | S-1/A | 09/18/2015 | 10.3(D) | |
| 10.5(E)† | Side Letter to License Agreement, dated January 9, 2014, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc. | S-1/A | 09/30/2015 | 10.3(E) | |
| 10.5(F) | Amendment No. 2 to License Agreement, dated May 11, 2015, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc. | S-1/A | 09/18/2015 | 10.3(F) | |
| 10.5(G)† | Side Letter to License Agreement, dated August 24, 2015, by and between Mirna Therapeutics, Inc. and Marina Biotech, Inc. | S-1/A | 09/11/2015 | 10.3(G) | |
| 10.6† | Amended and Restated Agreement, dated February 6, 2014, by and between Mirna Therapeutics, Inc. and Yale University. | S-1/A | 09/11/2015 | 10.4 | |
| 10.7† | License Agreement, dated March 10, 2013, by and between Mirna Therapeutics, Inc. and University of Zurich. | S-1/A | 09/11/2015 | 10.5 | |

| | | | | | |
|---|---|---|---|---|---|
| 10.8† | Supply Agreement for a Liposomal Formulation, dated November 18, 2012, by and between Mirna Therapeutics, Inc. and Polymun Scientific Immunbiologische Forschung GmbH. | S-1/A | 08/24/2015 | 10.7 | |
| 10.9 | Sublease, dated October 31, 2014, by and between Mirna Therapeutics, Inc. and Asuragen, Inc. | S-1/A | 08/24/2015 | 10.11 | |
| 10.10† | Cancer Research Grant Contract, dated August 31, 2010, by and between Mirna Therapeutics, Inc. and the Cancer Prevention and Research Institute of Texas. | S-1/A | 08/24/2015 | 10.6 | |
| 10.11 | Cancer Research Grant Contract, dated September 1, 2015, by and between Mirna Therapeutics, Inc. and the Cancer Prevention and Research Institute of Texas. | S-1/A | 09/11/2015 | 10.19 | |
| 10.12 | Stock Purchase Agreement, dated September 1, 2015, by and between Mirna Therapeutics, Inc. and the Cancer Prevention and Research Institute of Texas. | S-1/A | 09/11/2015 | 10.15 | |
| 10.13* | Patent License Agreement, dated December 31, 2015, by and between Rosetta Genomics Ltd. and Mirna Therapeutics, Inc. | | | | X |
| 10.14(A)# | 2008 Long Term Incentive Plan, as amended. | S-1/A | 08/24/2015 | 10.8(A) | |
| 10.14(B)# | Form of Notice of Stock Option Grant under 2008 Long Term Incentive Plan. | S-1/A | 08/24/2015 | 10.8(B) | |
| 10.14(C)# | Form of Stock Option Agreement under 2008 Long Term Incentive Plan. | S-1/A | 08/24/2015 | 10.8(C) | |
| 10.15(A)# | 2015 Equity Incentive Award Plan. | S-1/A | 09/18/2015 | 10.9(A) | |
| 10.15(B)# | Form of Stock Option Grant Notice and Stock Option Agreement under the 2015 Equity Incentive Award Plan. | S-1/A | 09/11/2015 | 10.9(B) | |
| 10.15(C)# | Form of Restricted Stock Award Agreement and Restricted Stock Unit Award Grant Notice under the 2015 Equity Incentive Award Plan. | S-1/A | 09/11/2015 | 10.9(B) | |
| 10.16# | 2015 Employee Stock Purchase Plan. | S-1/A | 09/18/2015 | 10.10 | |
| 10.17# | Non-Employee Director Compensation Program. | S-1/A | 09/18/2015 | 10.11 | |
| 10.18# | Form of Change in Control Severance Agreement. | S-1/A | 09/11/2015 | 10.12 | |
| 10.19# | Form of Indemnification Agreement. | S-1/A | 09/11/2015 | 10.13 | |
| 10.20(A)# | Employment Agreement, dated November 4, 2009, by and between Mirna Therapeutics, Inc. and Paul Lammers, M.D., M.Sc. | S-1/A | 09/11/2015 | 10.16(A) | |
| 10.20(B)# | First Amendment to Employment Agreement, dated January 5, 2011, by and between Mirna Therapeutics, Inc. and Paul Lammers, M.D., M.Sc. | S-1/A | 09/11/2015 | 10.16(B) | |
| 10.21(A)# | Offer Letter, dated April 29, 2013, by and between Mirna Therapeutics, Inc. and Sinil Kim, M.D. | S-1/A | 09/11/2015 | 10.17(A) | |
| 10.21(B)# | Employment Agreement, dated May 22, 2013, by and between Mirna Therapeutics, Inc. and Sinil Kim, M.D. | S-1/A | 09/11/2015 | 10.17(B) | |
| 10.22# | Employment Agreement, dated March 1, 2014, by and between Mirna Therapeutics, Inc. and Casi DeYoung. | S-1/A | 09/11/2015 | 10.18 | |
| 10.23(A)# | Offer Letter, dated August 31, 2015, by and between Mirna Therapeutics, Inc. and Alan Fuhrman. | S-1/A | 09/18/2015 | 10.20(A) | |
| 10.23(B)# | Employment Agreement, dated September 8, 2015, by and between Mirna Therapeutics, Inc. and Alan Fuhrman. | S-1/A | 09/18/2015 | 10.20(B) | |
| 10.24(A)# | Employment Agreement, dated April 18, 2013, by and between Mirna Therapeutics, Inc. and Jon Irvin. | S-1/A | 09/18/2015 | 10.21(A) | |

| | | | | | |
|---|---|---|---|---|---|
| 10.24(B)# | Amendment No. 1 to the Employment Agreement, dated August 1, 2014, by and between Mirna Therapeutics, Inc. and Jon Irvin. | S-1/A | 09/18/2015 | 10.21(B) | |
| 10.25(A)# | Offer Letter, dated September 17, 2015, by and between Mirna Therapeutics, Inc. and Miguel Barbosa, Ph.D. | S-1/A | 09/18/2015 | 10.22 | |
| 10.25(B)# | Employment Agreement, dated September 23, 2015, by and between Mirna Therapeutics, Inc. and Miguel Barbosa, Ph.D. | S-1/A | 09/25/2015 | 10.22(B) | |
| 23.1 | Consent of independent registered public accounting firm. | | | | X |
| 24.1 | Power of Attorney (included on the signature page hereto). | | | | X |
| 31.1 | Certification of Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002. | | | | X |
| 31.2 | Certification of Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002. | | | | X |
| 32.1** | Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002. | | | | X |
| 101.INS | XBRL Instance Document | | | | X |
| 101.SCH | XBRL Taxonomy Extension Schema Document | | | | X |
| 101.CAL | XBRL Taxonomy Extension Calculation Linkbase Document | | | | X |
| 101.DEF | XBRL Taxonomy Extension Definition Linkbase Document | | | | X |
| 101.LAB | XBRL Taxonomy Extension Labels Linkbase Document | | | | X |
| 101.PRE | XBRL Taxonomy Extension Presentation Linkbase Document. | | | | X |

† Confidential treatment has been granted for certain information contained in this exhibit. Such information has been omitted and filed separately with the Securities and Exchange Commission.

* 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 Securities and Exchange Commission.

# Indicates management contract or compensatory plan.

** The certification attached as Exhibit 32.1 that accompanies this Form 10-K is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Mirna Therapeutics, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Form 10-K, irrespective of any general incorporation language contained in such filing.

**Exhibit 10.13**

[***] 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.

# PATENT LICENSE AGREEMENT

This PATENT LICENSE AGREEMENT, effective as of December 31, 2015 (the "Effective Date"), is entered into between Rosetta Genomics Ltd., a corporation organized under the laws of the State of Israel, with offices at 10 Plaut Street, Science Park, Rehovot 76706, Israel ("Rosetta ") and Mirna Therapeutics, Inc., a Texas corporation with offices at 2150 Woodward St., Suite 100, Austin, TX 78744 ("Mirna"). Rosetta and Mirna are hereafter referred to collectively as the "Parties," and each individually as a "Party."

**WHEREAS**, Rosetta is a co-owner of the Licensed Patents, and has the right to grant licenses thereunder (defined below);

**WHEREAS**, Mirna [***]; and

**WHEREAS**, [***] Rosetta desires to grant such license, in each case on the terms and subject to the conditions set forth herein.

**NOW THEREFORE**, in consideration of the foregoing premises and the covenants, warranties and indemnities set forth herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, intending to be legally bound the Parties agree as follows:

## 1. DEFINITIONS

1.1. The following terms when capitalized have the meanings set forth below:

(a) "Affiliate" means, with respect to a Party, any entity that is controlled by, controls, or is under common control with such Party, provided that such entity shall be an Affiliate hereunder only for so long as such control exists. For purposes of this definition, the term "control" means: (i) direct or indirect ownership of more than fifty percent (50%) of the voting interest in the entity in question, provided, however, that if local law requires a minimum percentage of local ownership, control will be established by direct or indirect beneficial ownership of one hundred percent (100%) of the maximum ownership percentage that may, under such local law, be owned by foreign interests; or (ii) possession, directly or indirectly, of the power to direct or cause the direction of management or policies of the entity in question (whether through ownership of securities or other ownership interests, by contract or otherwise)..

(b) "Agreement" means this Patent License Agreement, together with all Schedules hereto, and any duly executed amendments to the foregoing.

(c) "Business Day" means any day other than a Saturday, Sunday, or day on which banking institutions in New York, New York and Austin, Texas are authorized or obligated by applicable Law or executive order to be closed.

(d) "Compound" means the Current Compound and/or any Non-Exclusive Compound, as applicable.

(e) "Covered Sale" means the Sale by Mirna or any Sublicensee of a Product to a Third Party, where (i) such Sale, (ii) the importation of such Product, or (iii) the manufacturing of such Product, is in a jurisdiction in which there is, at the time of such event: (A) at least one patent application for a Licensed Patent that, at the applicable time, has not been pending for more than [***] ([***]) years or (B) at least one issued and unexpired Licensed Patent, and in the case of (A) or (B) has not been dedicated to the public, disclaimed, abandoned or held unenforceable by a court or other body of competent jurisdiction (which decision is not appealable or has not been appealed within the time allowed for appeal) or admitted invalid or unenforceable through reexamination, reissue, disclaimer or otherwise.

(f) "Entity" means a corporation, association, partnership, business trust, joint venture, limited liability company, proprietorship, unincorporated association or other organization or individual that can exercise independent legal standing.

(g) "Governmental Authority" means any federal, national, supranational, state, provincial, local or other government, governmental, regulatory or administrative authority, agency or commission or any court, tribunal, or judicial or arbitral body.

(h) "Homologue" means a nucleic acid that comprises a nucleic acid sequence that is [***]% to[***]% identical to either of the nucleic acid sequences set forth in Schedule C.

(i) "Law" means any U.S. or non U.S. law (including common law), ordinance, writ, statute, treaty, rule or regulation, decree, judgment, consent decree or other governmental requirement of any Governmental Authority.

(j) "Licensed Patents" means (i) the patent applications and issued patents listed in Schedule A attached hereto, together with (ii) any application or patent claiming priority to any such application or patent, and any substitutions, divisions, continuations, continuing prosecution applications, extensions, term restorations, renewals, or continuations-in-part of any such applications or patents issuing on any of the foregoing applications and all reexaminations, substitutions, or reissues thereof, and any and all foreign counterparts of any and all of the foregoing, in each case to the extent such patent or patent application is owned or controlled by Rosetta and licenseable by Rosetta under the terms hereof.

(k) "Current Compound" means a compound with the sequence set forth in Schedule B attached hereto, which is the Mirna active pharmaceutical ingredient included in MRX34 that currently is the subject of clinical trials.

(l) "Mimetic of miR-34a" means any synthetic polynucleotide having the sequence as set forth in Schedule C.

(m) "Net Sales" means the gross amount, excluding [***], of consideration (whether for payment or in exchange for other goods or services) invoiced by Mirna or its Sublicensee for any Covered Sale of a Product to a Third Party, after deduction of the Qualifying Costs (defined below).

[***] 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.

(i) "Qualifying Costs" means the following amounts [***] by Mirna (or, as applicable, its Sublicensee):

(1) sales taxes (including value added taxes and other similar taxes) to the extent applicable to such Sale [***];

(2) discounts granted on the relevant Sale and not already reflected in the invoiced price and credits, rebates, chargebacks, and other deductions and allowances, if any, actually granted on account of price adjustments, recalls, rejections or returns of products or services previously sold, provided that, for the avoidance of doubt, a chargeback or other deduction shall not be excluded if it already has been accounted for under Section 1.1(m)(i)(4);

(3) freight, postage and duties, and transportation charges relating to such Sale (including handling and insurance thereto) separately identified invoice or other documentation maintained in the ordinary course of business;

(4) [***].

For the avoidance of doubt, an amount falling into multiple categories above may not be deducted more than once.

(ii) Mirna shall [***] any proposed excluded Qualifying Costs or other exclusions pursuant to Section 1.1(m)(iii) through 1.1(m)(v) in accordance with Section 4.4(b). For the avoidance of doubt, amounts received by Mirna from a Sublicensee (or if the grant of a multiple tier Sublicense is permitted hereunder, received by a Sublicensee from its sub-sublicensee) that are in consideration of the grant of sublicense rights under the Licensed Patents but are not calculated based on or otherwise related to the Covered Sale of a Product, are Sublicensing Revenue and not Net Sales.

(iii) Sales between Mirna and its Affiliates or Sublicensees for resale shall be excluded from the computation of Net Sales, and no payments will be payable on such sales except where such Affiliates or Sublicensees are end users.

(iv) Notwithstanding the foregoing, Product provided for clinical or non-clinical research and trials or as Product samples shall be excluded from Net Sales. Product provided [***].

(v) If a Product is Sold as part of a Combination Product (as defined below), Net Sales will be calculated by multiplying the (x) Net Sales of the Combination Product calculated as above (i.e., calculated as for a non-Combination Product) by (y) the fraction (A/(A+B)), where:

(1) "A" is the average gross selling price during the previous calendar quarter in such country of such Product as the sole therapeutically active component; and

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(2) "B" is the average gross selling price during the previous calendar quarter in such country of the other therapeutically active component contained in the Combination Product.

If "A" or "B" cannot be determined by reference to non-Combination Product Sales as described above, then Net Sales will be calculated as above, but the average gross selling price in the above equation will be [***] prior to the end of the accounting period in question based on[***] that takes into account, in the applicable country, [***] in the Combination Product. If [***] the end of the applicable accounting period, [***]. As used in this Section 1.1(m)(v), "Combination Product" means a Product that contains one or more additional therapeutic agents (whether co-formulated or co-packaged) that are not the therapeutic agent in the Product. For the avoidance of doubt, drug delivery vehicles, adjuvants, and excipients, and equipment used to administer a Product, will not be deemed an "additional therapeutic agent" for the purposes of the definition of "Combination Product."

(n) "Non-Exclusive Compound" means a compound that is (a) a Mimetic of miR-34a or (b) a miR-34a Homologue, in each case other than the Current Compound.

(o) "p53" means [***] protein encoded by the TP53 gene.

(p) "p53 Status" means [***].

(q) "Phase II Trial" means any human clinical trial conducted on patients with the disease or condition being studied, the principal purpose of which is to determine (i) preliminary evidence of efficacy and safety and/or (ii) selection of the dose or dose range to be studied in a subsequent Phase II Trial(s) or Phase III Trial(s) for such product, as further described in 21 C.F.R. §312.21(b) (including, any such clinical study in any country other than the United States).

(r) "Phase III Trial" means a human clinical trial, the principal purpose of which is to establish safety and efficacy of the Product in patients with the disease being studied, as further described in 21 C.F.R. §312.21(c) (including, any such clinical study in any country other than the United States).

(s) "Pivotal Trial" means (i) a Phase III Trial or (ii) a Phase II Trial, which is designed and intended to be of a size and statistical power sufficient to serve as a pivotal study to support the filing of an application for drug regulatory approval.

(t) "Quarter" means any respective period of three (3) consecutive calendar months ending on March 31, June 30, September 30 and December 31 of any Year.

(u) "Product" means any pharmaceutical product comprising or containing (a) the Current Compound and/or (b) one or more Non-Exclusive Compounds.

(v) "Sale" means, with respect to a Product, the sale, importation lease, rental, transfer or other exploitation of such Product. "Sell" and "Sold" have the correlative meanings.

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(w) "Sublicensing Revenues" means [***] received by Mirna from a Sublicensee in consideration of a grant of a Sublicense under the Licensed Patents to such Sublicensee, or [***] under the Licensed Patents, which in each case may include [***] in consider for such grant of a Sublicense, but excluding any consideration received by Mirna from a Sublicensee as *bona fide* payments in consideration for:

(i) [***];

(ii) [***];

(iii) [***];

(iv) [***];

(v) [***];

(vi) [***] payments made by such Sublicensee to Mirna in consideration of [***], provided that the [***] that are attributable to Sublicense Revenues hereunder will be [***] in accordance with Section 4.4(b), including with [***].;

(vii) [***]; and

(viii) [***].

(items (i) through (viii), the "Excluded Revenue"). For the avoidance of doubt, an amount that falls into more than one of the categories of exclusions listed above may not be deducted more than once. Mirna shall [***] in accordance with Section 4.4(b).

(x) "Third Party" means with respect to any Party, any Entity other than such Party and its Affiliates.

(y) "Tier 1 Product" means a Product where (i) the assessment of p53 Status is on the approved label of such Product or (ii) Mirna (or its Sublicensee) Sells a [***], or (iii) Mirna (or its Sublicensee) requires or recommends that [***]; provided however [***].

(z) "Tier 2 Product" means a Product, other than a Tier 1 Product, where [***].

(aa) "Tier 3 Product" means any Product other than a Tier 1 Product or Tier 2 Product.

(bb) "WIS" means Weizmann Institute of Science.

(cc) "Year" means a calendar year.

(dd) "Yeda" means Yeda Research and Development Company, Ltd., a corporation organized under the laws of Israel.

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(ee) "Yeda Agreement" means the Agreement between Rosetta and Yeda dated April 17, 2005

| **Other Defined Terms** | **Section** |
|---|---|
| "Audit" | 5.2 |
| "Bankruptcy Code" | 11.8 |
| "Challenge" | 7.2(a) |
| "Claim" | 10.5 |
| "Combination Product" | 1.1(m)(v) |
| "Discloser" | 8.1 |
| "Dispute" | 11.2 |
| "Dispute Notice" | 11.2(a) |
| "Effective Date" | Introductory Paragraph |
| "Excluded Revenue" | 1.1(w) |
| "Expiration Date" | 9.1 |
| "Indemnitees | 10.5 |
| "License" | 2.1 |
| "Losses" | 10.5 |
| "Milestone Payment" | 4.2 |
| "Mirna" | Introductory Paragraph |
| "Negotiation Period" | 6.1 |
| "Notice or notice" | 11.5 |
| "Offset" | 4.3(b) |
| [***] | [***] |
| "Qualifying Costs" | 1.1(m) |
| "Representative" | 8.1 |
| "Recipient" | 8.1 |
| "Rosetta" | Introductory Paragraph |
| "Royalties" | 4.3(a) |
| "Sublicense" | 2.3 |
| "Sublicense Agreement" | 2.3 |
| "Sublicensee" | 2.3 |
| "Sublicense Fees" | 4.3(c) |
| "Term" | 9.1 |
| "Third Party Payment" | 4.3(b) |
| "Up-Front Payment" | 4.1 |
| "Yeda Confidential Information" | 8.5 |

1.2. Rules of Construction.

(a) Each of the Parties acknowledges and agrees that this Agreement has been diligently reviewed by and negotiated by and between them, that in such negotiations each of them has been represented by competent counsel and that the final agreement contained herein, including the language whereby it has been expressed, represents the joint efforts of the Parties hereto and their counsel. Accordingly, in the event an ambiguity or a question of intent or interpretation arises, this Agreement shall be construed as if drafted jointly by the Parties and no

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presumption or burden of proof shall arise favoring or disfavoring any Party by virtue of the authorship of any provisions of this Agreement.

(b) The definitions of the terms herein shall apply equally to the singular and plural forms of the terms defined, and derivative forms of any capitalized term defined herein shall have meanings correlative to the meaning specified herein. Whenever the context may require, any pronoun shall include the corresponding masculine, feminine and neuter forms. The words "include", "includes" and "including" shall be deemed to be followed by the phrase "without limitation". The word "will" shall be construed to have the same meaning and effect as the word "shall". The word "any" shall mean "any and all" unless otherwise clearly indicated by context. "$" as used in this Agreement means the lawful currency of the United States.

(c) Unless the context requires otherwise: (i) any definition of or reference to any agreement, instrument or other document herein shall be construed as referring to such agreement, instrument or other document as from time to time amended, supplemented or otherwise modified (subject to any restrictions on such amendments, supplements or modifications set forth herein or therein), (ii) references to this Agreement include all Schedules, which are incorporated herein and made part hereof, and any duly executed amendments to the foregoing; (iii) any reference to any Laws herein shall be construed as referring to such Laws as from time to time enacted, repealed or amended, (iv) where either Party's consent is required hereunder, except as otherwise specified herein, such Party's consent may be granted or withheld in such Party's sole discretion, (v) any reference herein to any person shall be construed to include the person's successors and assigns, (vi) the words "herein" "hereof' and "hereunder", and words of similar import, shall be construed to refer to this Agreement in its entirety and not to any particular provision hereof, and (vii) all references herein to an Article, Section, or Schedule, unless otherwise specifically provided, shall be construed to refer to an Article, Section, or Schedule of this Agreement.

## 2. GRANT OF LICENSE

2.1. Grant. Subject to the terms of this Agreement, Rosetta hereby grants to Mirna, effective as of the Effective Date and during the Term:

(a) a non-assignable and non-transferable (except as permitted under Section 11.7), worldwide, exclusive license, with the right to authorize and grant Sublicenses under the Licensed Patents solely as set forth in Section 2.3, to: (i) make, have made, use, offer for sale, sell and import Products [***], and (b) perform processes covered by the Licensed Patents solely in connection the activities permitted under subsection (a)(i); and

(b) a non-assignable and non-transferable (except as permitted under Section 11.7), worldwide, non-exclusive license, with the right to authorize and grant Sublicenses under the Licensed Patents solely as set forth in Section 2.3, to: (i) make, have made, use, offer for sale, sell and import Products that [***] and (ii) perform processes covered by the Licensed Patents solely in connection with the activities permitted under subsection (b)(i).

(collectively (a) and (b), the "License").

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2.2. Limited Exclusivity. The License shall be exclusive solely for Products that [***], and nothing herein is intended to limit or prohibit Rosetta from granting licenses under the Licensed Patents to any Person for any other product or service.

2.3. Sublicenses.

(a) The License includes the right for Mirna to grant to third parties a sublicense of the rights granted under the License (each, a "Sublicensee" and such sublicense, a "Sublicense") in accordance with this Section 2.3, Mirna may not grant to such Sublicensee the right to grant any further Sublicenses, without the prior written consent of Rosetta, such consent of Rosetta not to be unreasonably withheld, and the prior written consent of Yeda in accordance with the Yeda Agreement. In the event Mirna desires to obtain such consents to grant a sublicense with the right to grant further sublicenses,[***]. Mirna shall at all times be responsible to Rosetta for its Sublicensee's compliance with the terms of this Agreement and the Yeda Agreement that are applicable to Rosetta's sublicensees and sub-sublicensees.

(b) Mirna agrees that each Sublicense shall be pursuant to a written sublicense agreement (a "Sublicense Agreement") which shall comply with the following:

(i) [***] terms hereof applicable to a Sublicensee, and [***], including [***].

(ii) provide that: the Sublicense is personal to the Sublicensee and may not be sold, assigned, delegated or otherwise transferred or encumbered, in whole or in part, without the prior written consent of each of Rosetta and Yeda (such consent by Yeda to be sought and provided in accordance with Section 5.7.5 of the Yeda Agreement), and the Sublicensee may [***] of its receipt from the Sublicensee. For the avoidance of doubt, for purposes of this, Sublicense Agreement, a merger or consolidation of the Sublicensee with a third party where the Sublicensee is the surviving entity, or the acquisition of all or substantially all of the stock of control of the Sublicensee, shall not be deemed an assignment and the prior consent of Rosetta or Yeda is not required for such transaction .

(iii) provide that the Sublicensee shall have no right to grant further sublicenses;

(iv) provide that all Yeda-dependent provisions under the Sublicense will terminate in the event that the Yeda Agreement is terminated;

(v) provide that the Sublicense will automatically terminate on the earlier of (x) the Expiration Date or (y) the date on which this Agreement expires or terminates for any reason, provided that in the event that this Agreement is terminated prior to the Expiration Date, and provided that a Sublicensee is at that time not in breach of its Sublicense Agreement, Rosetta agrees to enter into good faith negotiations with Sublicensee with respect to the provision of a direct license between Rosetta and such Sublicensee on substantially the same financial terms as those set forth herein and in the Sublicense Agreement, subject to the mutual agreement of Rosetta and the Sublicensee.

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(c) Mirna shall promptly provide Rosetta (i) [***], (ii) the[***], and (iii) [***] after its execution. All amendments to any such Sublicense shall comply with this Section 2.3(c), and [***].

(d) Mirna shall promptly notify Rosetta in the event that any Sublicensee is in material breach of its Sublicense Agreement, and will promptly provide Rosetta with a copy of any notice of breach, termination, or the like sent to or received from a Sublicensee. Rosetta shall [***].

2.4. Limitations. Mirna and its Sublicensees:

(a) may exercise rights under the Licensed Patents solely as expressly permitted under the License;

(b) in connection with the exercise of their rights and compliance with their obligations under this Agreement, shall at all times strictly comply with all applicable Laws now or hereafter in effect, and make, obtain, and maintain in force at all times during the Term, all filings, registrations, reports, licenses, permits, and authorizations required under applicable Law to perform its obligations under this Agreement;

(c) acknowledges that Yeda is a co-owner of some or all of the Licensed Patents, that Rosetta and certain of its rights with respect to the licensing of the Licensed Patents is subject to the Yeda Agreement; and agrees that Mirna and its Sublicensee are obligated hereunder and agree to comply with all applicable terms of the Yeda Agreement, and that all Yeda-dependent provisions under this Agreement will terminate in the event that the Yeda Agreement is terminated. Mirna acknowledges that it has received and reviewed a copy of the Yeda Agreement prior to entering into this Agreement;

(d) acknowledges and agrees that Rosetta has no responsibility for the Products manufactured or sold or on behalf of Mirna or its Sublicensees, including no responsibility for the formulation or efficacy thereof, or the pricing thereof or any discounts or price reductions that may be applied with respect thereto .

2.5. Reservation of Rights. Mirna acknowledges and agrees that: (a) except for the rights and licenses expressly granted under the License, it shall have no rights under this Agreement, by implication, estoppel or otherwise, in, under or to any Intellectual Property now or hereafter owned by Rosetta or any of its Affiliates, and all rights not expressly licensed or granted hereunder are expressly reserved by Rosetta and its Affiliates; (b) no license is granted hereunder to Mirna under any patent claim owned by Rosetta or its Affiliates other than the patents expressly listed in the definition of Licensed Patents; and (c) no license is granted under the Licensed Patents to any Entity other than Mirna. For the avoidance of doubt, and without limiting the foregoing Rosetta is under no obligation hereunder to deliver, and shall not deliver, to Mirna any data or know-how relating to the License Patents, including any data relating to results of the joint research conducted by Rosetta and Yeda under the Yeda Agreement (i.e., the “Results” as defined in the Yeda Agreement).

3. [***]

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3.1. [***].

4. **PAYMENTS**

4.1. Up-front Payment. A non-refundable payment in the amount of one million six hundred thousand U.S. Dollars ($1,600,000) (the "Up-Front Payment") will be due by Mirna to Rosetta upon execution of this agreement which shall be paid within [***] ([***]) Business Days after such execution.

4.2. Milestone Payments. Mirna shall pay to Rosetta the following non-refundable milestone payments (the "Milestone Payments"). For the avoidance of doubt, the Milestones Payments shall be payable [***]:

(a) Tier 1 Product. Mirna will provide written Notice to Rosetta within [***] ([***]) days of [***], which Notice shall specify [***], and Mirna will make a payment to Rosetta in the amount of [***] U.S. Dollars ($[***]) within [***] ([***]) days of [***].

(b) Tier 2 Product. Mirna will provide written notice to Rosetta within [***], which notice shall specified [***], and Mirna will make a payment to Rosetta in the amount of [***] U.S. Dollars ($[***]) within [***] ([***]) days of [***].

4.3. Royalties and Sublicense Fees.

(a) Royalty Rates. Mirna will pay to Rosetta running royalties on Net Sales of Product by Mirna or its Sublicensees on a country-by-country and Product-by-Product basis as follows ("Royalties"):

(i) For Sales of Tier 1 Products, [***]% of Net Sales;

(ii) For Sales of Tier 2 Products, [***]% of Net Sales; and

(iii) For Sales of Tier 3 Products, [***]% of Net Sales.

For the avoidance of doubt, no Royalties shall be payable under this Section 4.3 for any Sales of Products made after the Expiration Date.

(b) Certain Reduction of [***]

(i) For Third Party Payments. In the event that, in order to exercise the rights granted under the License, Mirna and/or its Sublicensee licenses [***] and makes [***] to such Third Party in consideration of such license under such intellectual property (a "Third Party Payment"), then with respect to Products covered by such Third Party Payment, Mirna shall be entitled to reduce the amount of [***] payable to Rosetta hereunder by an amount equal to up to [***] percent ([***]%) of the corresponding Third Party Payment (the "Offset"), provided that in no event may [***] be reduced by more than [***] percent ([***]%) of the amount that would otherwise have been due and payable hereunder.

(ii) For Termination of the Yeda Agreement. If the Yeda Agreement is terminated and Rosetta has granted to Mirna the nonexclusive license under Section 10.3(b),

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then the amount of [***] payable to Rosetta, including [***] shall be reduced by [***] percent ([***]%) of the amount that would otherwise have been due and payable hereunder.

(c) Sublicense Fees. With respect to all Sublicensing Revenues received by Mirna, Mirna shall pay to Rosetta a percentage of such Sublicensing Revenue ("Sublicense Fees"), which percentage will be based on [***] by the Sublicensee, such percentage determined as of the time such Sublicense Fees become due, in accordance with the following:

| | | | |
|---|---|---|---|
| [***] | [***] | [***] | [***] |
| [***] | [***] | [***] | [***] |
| [***] | [***] | [***] | [***] |
| [***] | [***] | [***] | [***] |

For the avoidance of doubt, application of the foregoing shall be based on the [***] by such Sublicensee (for example – if a Product can be [***], it will be considered a [***] Product). For the purpose of this Section, "[***]" means [***].

4.4. Reports and Payments.

(a) Quarterly Reports. For each Quarter during the Term, within [***] ([***]) days of the end of such Quarter, Mirna and/or its Sublicensee, as applicable, shall provide to a written report, certified as correct by its chief financial officer or similar officer, setting forth the amount of Royalties and Sublicense Fees that accrued with respect to such Entity in the preceding Quarter and the manner in which such amounts were calculated in accordance with this Agreement. Such report shall set forth, for Mirna and each Sublicensee, on a Product-by-Product and jurisdiction by jurisdiction basis, the following applicable amounts that accrued during such Quarter:

(i) Net Sales before any deductions or exclusions;

(ii) all exclusions from Net Sales separately listed, including Qualifying Costs and other exclusions or deductions applied pursuant to each of Sections 1.1(m)(ii) through 1.1(m)(iv).

(iii) Third Party Payments any adjustment for Compound Products as permitted under Section 1.1(m)(v);

(iv) all Excluded Revenue excluded from Sublicensing Revenue pursuant to Section 1.1(w);

(v) any Offset permitted pursuant to Section 4.3(b);

(vi) net Royalties payable hereunder, calculated in accordance with Section 4.3, and

(vii) net Sublicense Fees payable hereunder, calculated in accordance with Section 4.3.

(b) Payments. Together with such report, Mirna shall make a payment to Rosetta of all Royalties and Sublicense Fees payable for such Quarter, and provide written documentation, including [***].

(c) Annual Reports. Mirna shall provide to Rosetta written reports within [***] ([***]) days of the end of each calendar year, which shall include [***] of: (i) [***] of the Products in the said year; (i) [***] activities related to the Products during the said year; (i) Mirna's and any Sublicensee's (and permitted sub-Sublicensee's) plans in respect of the [***] under the Agreement or any Sublicense (or permitted sub-Sublicense) for [***]. At Rosetta's request, from time to time, Mirna shall [***] relating its and any Sublicensee's (and permitted sub-Sublicensee's) [***] under the Agreement or Sublicense (or permitted sub-sublicense).

4.5. Patent Costs. [***] will [***] for [***] percent ([***]%) of all costs incurred with respect to the prosecution or protection of the Licensed Patents incurred by [***], provided such amount [***] shall be prorated if [***]. By way of example and not limitation, if [***]. [***] shall [***] issue invoices to [***] specifying the [***], and [***] shall pay the invoice amount within [***] ([***]) days of the issuance of such invoice.

4.6. Method of Payment. Unless otherwise agreed to by the Parties, all payments by Mirna hereunder shall be effected by direct bank transfer to the following Rosetta bank account:

| | |
|---|---|
| Bank: | [***] |
| ABA# | [***] |
| Account Name: | [***] |
| Account No: | [***] |

All banking charges shall be from [***]'s account. All payments contemplated under this Agreement shall be denominated in U.S. Dollars (US$) unless otherwise agreed by the Parties.

4.7. Taxes. All payments hereunder by Mirna shall be net of any withholding taxes that may be paid to any government or tax authority. Mirna shall be responsible for all taxes imposed on payments made under this Agreement, excepting income taxes payable in respect of Rosetta's income.

4.8. Late Fees. Mirna shall be liable for interest on any overdue payment under this Agreement commencing on the date such payment became due at a [***] rate equal to [***] in respect of unapproved overdrafts in current accounts in the relevant currency, except that [***] (provided that [***]). If such interest rate exceeds the maximum legal rate in the jurisdiction where a claim therefore is being asserted, the interest rate shall be reduced to such maximum legal rate.

## 5. RECORDS AND AUDIT

5.1. Recordkeeping. Mirna shall keep and require its Sublicensees to keep, complete, accurate and correct books of account and records consistent with GAAP and sound business and accounting principles and practices and in such form and in such details as to enable the determination of the amounts due to Mirna or Rosetta, as the case may be, in terms hereof or any Sublicense Agreement. Mirna shall supply to Rosetta at the end of each Year, commencing with

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the first Year in which any amount is payable by Mirna to Rosetta hereunder, a report signed by Mirna's independent auditors in respect of the amounts due to Rosetta pursuant to Section 4 in respect of the Year covered by the said report and containing details in accordance with Section 4.4 above in respect of the Quarterly reports. Mirna shall retain, and cause its Sublicensees to retain, the foregoing books of account for [***] ([***]) years after the end of each Year during the Term, and, if this Agreement is terminated for any reason whatsoever, for [***] ([***]) years after the end of the Year in which such termination becomes effective.

5.2. Audit. During the Term [***], no more often than [***] in any [***] ([***]) month period, Rosetta shall have the right to have an independent third party auditor audit Mirna's and/or its Sublicensee's books and records for purposes of verifying compliance with its payment and other obligations hereunder (an "Audit"). If Rosetta elects to have such an Audit conducted, Rosetta shall select the independent auditor, which auditor is subject to approval by Mirna, such approval not to be unreasonably withheld, delayed or conditioned. Any such Audit shall be conducted by such auditor upon at least [***] ([***]) days advance notice and during normal business hours. Any such Audit shall be performed at Rosetta's expense; provided, that in the event that the Audit shows any underpayment greater than [***] percent ([***]%) of the aggregate amounts of the payment reportable by Mirna to Rosetta for any Year, then Mirna shall reimburse Rosetta for the cost of the Audit.

## 6. DIAGNOSTIC PRODUCTS

6.1. [***] Diagnostic Product. In the event that Mirna intends to [***], then its shall [***]. Mirna [***]diagnostic product [***] until [***] in accordance with this Section 6.1. In the event that [***], the Parties will [***] the [***] such diagnostic product, [***]). If [***], or if [***], then Mirna [***] develop and commercialize such diagnostic product, [***] such diagnostic product, [***], Mirna [***]. For the avoidance of doubt, Mirna's [***] applies and accrues with respect to [***] during the Term.

## 7. INTELLECTUAL PROPERTY

7.1. Licensed Patents. Mirna acknowledges and agrees that:

(a) Rosetta retains all right, title and interest in and to the Licensed Patents, and except for rights expressly granted to Mirna and its Subsidiaries under this Agreement, Mirna and its Sublicensees have no ownership or other rights in the Licensed Patents;

(b) Rosetta has no obligation hereunder to disclose or supply to Mirna or its Sublicensees any know-how, trade secrets or technology relating to the Products or the subject matter of the Licensed Patents.

7.2. No Challenges.

(a) [***], Mirna agrees, and shall cause its Sublicensee to agree, that Mirna and its Sublicensees shall not participate directly or indirectly in, or assist any other Entity with respect to, any judicial or administrative proceeding in any jurisdiction to invalidate or render unenforceable any Licensed Patent (a "Challenge").

(b) Without limiting Section 7.2(a), in the event that Mirna or its Sublicensee commences or participates in, directly or indirectly, any Challenge:

(i) Mirna or its Sublicensee, as the case may be, will provide [***] written notice to Rosetta, stating the basis for such Challenge [***];

(ii) Rosetta may immediately terminate this Agreement upon written notice to Mirna;

(iii) Mirna or its Sublicensee, as the case may be, will be required [***];

(iv) other than a Challenge brought before the United States Patent and Trademark Office, any Challenge of any U.S. License Patents shall be litigated in the courts located in New York, New York, and the Parties agree not to challenge personal jurisdiction in that forum; and

(v) during the Term and during pendency of the Challenge, Milestone Payments and Royalties due hereunder will be [***], and their payment shall be [***], and starting on the date that the Challenge is won by Rosetta, Milestone Payments and Royalties due hereunder will be [***].

(c) Exception. Notwithstanding anything to the contrary herein, Sections 7.2(a) and 7.2(b) shall not apply with respect to any Challenge asserted by Mirna or its Sublicensee, as the case may be, in response to or in defense of the prior assertion by Rosetta of a claim under such Licensed Patent against Mirna or such Sublicensee, as the case may be.

7.3. Prosecution of the Licensed Patents. As between the Parties, Rosetta retains the sole and exclusive right to apply for, prosecute and defend the Licensed Patents, [***], subject to the [***].

7.4. Enforcement of Licensed Patents.

(a) Monitoring. Mirna shall use commercially reasonable efforts to monitor Third Party infringement of the Licensed Patents with respect to any products competing with the Products, and shall provide notice to Rosetta if it learns of any alleged infringement.

(b) Protection. As between the Parties, Rosetta will have the sole and exclusive right, but not the obligation, for the protection of the Licensed Patents, including the initiation, defense, and management of any adversarial legal proceeding relating to the Licensed Patents, in any jurisdiction (including any declaratory judgment action, patent infringement action or opposition), at Rosetta's expense, subject to the reimbursement terms set forth in Section 4.5 If Mirna provides Notice to Rosetta demonstrating that a Third Party is infringing any Licensed Patent in any jurisdiction by making or selling within Mirna's exclusive field, and following such Notice Rosetta elects not to enforce the Licensed Patents against such alleged infringer, then during the period such Third Party is so infringing the Licensed Patents (as

demonstrated by Mirna), [***], provided that the foregoing [***] shall not apply if Rosetta has elected not to proceed against the accused Third Party [***]. Upon Rosetta's request, Mirna shall join in and/or provide cooperation with respect to any such action to enforce the Licensed Patents.

## 8. CONFIDENTIALITY

8.1. Non-Disclosure. Except as expressly permitted herein, a Party that receives disclosure of Confidential Information in connection with this Agreement (a "Recipient") from the other Party (a "Discloser") shall not disclose Discloser's Confidential Information, and shall prevent the disclosure of such information by Recipient's Representatives. "Confidential Information" means (a) the terms of this Agreement and the terms of the Yeda Agreement and (a) the Reports provided by Mirna to Rosetta pursuant to Section 4.4. Recipient shall use Confidential Information of Discloser solely during the Term and as necessary for Recipient to comply with its obligations, and exercise its rights, in accordance with the Agreement. Recipient may disclose Confidential Information of Discloser solely to its employees and independent contractors under their direction and control (each, a "Representative"), in each case solely to Representatives who are subject to a duty of non-use and non-disclosure at least as protective of Discloser and its Confidential Information as the provisions herein and who need to know such information in order for Recipient to reasonably exercise and perform its rights and obligations hereunder. Recipient also may disclose Discloser's Confidential Information as reasonably necessary in the operation of Recipient's business, to its financial advisors, accountants, attorneys and potential and actual investors and lenders under circumstances that reasonably ensure the confidentiality thereof.

8.2. Exclusions. The confidentiality obligations and use limitations set forth in this Agreement shall not apply to any of Discloser's Confidential Information that Recipient can demonstrate with competent written proof: (a) was lawfully in Recipient's possession prior to disclosure by Discloser hereunder; (b) was generally known, in the trade or business in which it is practiced by Discloser and/or had entered the public domain, at the time of disclosure to Recipient hereunder, or becomes so generally known and/or entered the public domain after such disclosure, through no action or inaction of Recipient or its employees, agents or independent contractors or (c) has come into the possession of Recipient from a Third Party who is not known by Recipient to be under any obligation to maintain the confidentiality of such information. For purposes of this Section 8.2, no combination of elements within the Confidential Information shall be deemed to be part of the public domain merely because the individual elements of such combination are part of the public domain, unless the entire combination itself, or the entire principle of use or operation of such combination (if any), is part of the public domain. In addition, no element within the Confidential Information shall be deemed to be a part of the public domain merely because it is embraced by more general information or data that is part of the public domain.

8.3. Terms of Agreement. Notwithstanding anything to the contrary herein, the terms of this Agreement are the Confidential Information of both Parties, and may not be disclosed by one Party without the consent of the other Party, provided that both Parties may disclose to third Parties that Mirna has been granted a royalty-bearing license under the Licensed Patents to sell

[***] 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.

Products, without disclosing any specific financial terms of this Agreement. Rosetta may issue a press release disclosing that Mirna has been granted a royalty-bearing license under the Licensed Patents to sell Products, and shall provide a copy of such press release to Mirna for its review and comment prior to issuance.

8.4. Disclosures Required by Law. In the event that Recipient is ordered to disclose Discloser's Confidential Information under applicable Law or pursuant to a judicial or governmental request, requirement or order, Recipient shall promptly provide written notice to Discloser of any required disclosure, which notice shall, to the extent reasonably practicable, be given a reasonable period of time in advance of such required disclosure. Upon Discloser's reasonable written request and at Discloser's sole cost, the Recipient shall take reasonable efforts to resist or limit such disclosure and assist Discloser in contesting such request, requirement or order or otherwise protecting Discloser's rights, such reasonable efforts shall be no less than efforts exerted by such Party to preserve the confidentiality of such Party's own similar Confidential Information. In the event either Party is required to file this Agreement with the Securities and Exchange Commission or any comparable non-United States regulatory agency, such Party shall apply for confidential treatment of this Agreement to the fullest extent permitted by applicable law, shall provide the other Party a copy of the confidential treatment request far enough in advance of its filing to give the other Party a meaningful opportunity to comment thereon, and shall incorporate in such confidential treatment request any reasonable comments of the other Party. If Discloser waives Recipient's compliance with this Agreement or fails to obtain a protective order or other appropriate remedy, Recipient will furnish only that portion of the Confidential Information that is legally required to be disclosed; provided that any Confidential Information so disclosed shall maintain its confidentiality protection for all purposes other than such legally compelled disclosure.

8.5. Yeda Confidential Information. Notwithstanding anything to the contrary herein, Mirna and its Sublicensees shall maintain in confidence the Yeda Agreement and the terms thereof hereof (hereinafter, collectively referred to as the "Yeda Confidential Information"), except and to the extent that Mirna and its Sublicensee can prove that any such information or data is in the public domain at the date of the signing hereof or becomes part of the public domain thereafter (other than through a violation by Mirna or a Sublicensee of this or its obligation of confidentiality) and except with regard to that portion, if any, of the Confidential Information expressly released by Rosetta from this obligation of confidentiality by notice in writing to Mirna to such effect. Mirna and its Sublicensees undertake not to make any use of the names of Yeda, WIS and their employees, without Yeda's prior written consent.

## 9. TERM AND TERMINATION

9.1. Term. The term of this Agreement shall commence on the Effective Date and end on the date on which no patent applications comprised within the Licensed Patents are pending and all issued Licensed Patents have expired (the "Expiration Date" and such term, the "Term") unless this Agreement is earlier terminated in accordance with this Section 9.

9.2. Termination At-will. This Agreement may be terminated without cause by Mirna upon one hundred and twenty (120) days' written notice, provided that the effective date of such

termination (the "Termination Date") must be at least eighteen (18) months from the Effective Date, and provided further that on the Termination Date Mirna pays to Rosetta an early termination fee as follows: (a) if as of the Termination Date Mirna has [***], the early termination fee shall be three million five hundred thousand dollars ($3,500,000) and (b) [***] the early termination fee will be two million dollars ($2,000,000). In the event of a termination under this Section 9.2, then the restriction on Challenges in Section 7.2 will not survive such termination, provided that if following termination Mirna or its Sublicensee [***], then Mirna or its Sublicensee, as the case may be, will be required to [***], provided further that [***] if Mirna has paid an early termination fee of three million five hundred thousand dollars ($3,500,000) in accordance with subsection (a) above, and (ii) [***] if Mirna has paid an early termination fee of two million dollars ($2,000,000) in accordance with subsection (b) above.

9.3. Termination for Cause. This Agreement may be terminated by Rosetta immediately upon written notice in the event of the occurrence of any of the following:

(a) Mirna is in material breach of this Agreement and fails to cure such material breach within forty (40) days of written notice of breach by Rosetta, and within fifteen (15) days for any breach of payment required hereunder. For the avoidance of doubt and without limitation, any failure to make timely payments due under this Agreement, a breach of Section 7.2 (No Challenge), or any breach hereunder that is a material breach of the Yeda Agreement, is a material breach of this Agreement for purposes of this Section 9.3(a). If Mirna [***], then the termination of this Agreement [***]; or

(b) A court determines that Mirna is insolvent; a petition in bankruptcy is filed against Mirna and is consented to, acquiesced in or remains undismissed for thirty (30) days; or makes a general assignment for the benefit of creditors, or a receiver is appointed for Mirna, and Mirna does not return to solvency before the expiration of a thirty (30) day period.

9.4. Effect of Termination. Upon expiration or termination of this Agreement for any reason:

(a) The License and all rights of Mirna and its Sublicensees with respect to the Licensed Patents, immediately will terminate;

(b) Within [***] ([***]) days of such expiration or termination, Mirna will provide a royalty report pursuant to Section 4.4, and make all payments due hereunder in respect of any accrued milestones or Products Sold during the Term; and

(c) Termination of this Agreement shall not constitute a termination or a waiver of any rights of either Party against the other Party accruing at or prior to the time of such termination. The obligations set forth in this Section 9.4 are without limitation of any other obligations of Mirna pursuant to this Agreement, and will not be affected by any dispute between the Parties with respect to this Agreement or any other matter. Upon termination of this Agreement as permitted hereunder there will be no refund, in whole or in part, of any payments hereunder already made. Expiration or termination of this Agreement shall not relieve Mirna of responsibility for any payment obligations or any liability for breach or otherwise accrued prior to the date of such expiration or termination.

[***] 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.

9.5. Survival. Notwithstanding anything to the contrary herein, upon expiration or termination of the Agreement for any reason, the rights and obligations of the Parties hereunder will terminate, except that Sections [***] (solely for [***]), [***] (except as provided in Section [***]),[***] and [***]will survive any expiration or termination of this Agreement for any reason.

## 10. REPRESENTATIONS AND WARRANTIES; LIMITATION OF LIABILITY; INDEMNITY.

10.1. Mutual Representations and Warranties. Each Party hereby represents and warrants to the other Party that:

(a) it is duly organized, validly existing and in good standing under the laws of the jurisdiction of its organization;

(b) the execution, delivery and performance of this Agreement by such Party has been duly authorized by all requisite action under the provisions of its charter, bylaws and other organizational documents, and does not require any action or approval by any of its shareholders or other holders of its voting securities or voting interests;

(c) it has the power and authority to execute and deliver this Agreement and to perform its obligations hereunder;

(d) this Agreement has been duly executed and is a legal, valid and binding obligation on such Party, enforceable against such Party in accordance with its terms; and

(e) the execution, delivery and performance by such Party of this Agreement and its compliance with the terms and provisions hereof does not and will not conflict with or result in a breach of or default under any obligation to any Third Party existing as of the Effective Date.

10.2. Representations and Warranties of Rosetta. Rosetta hereby represents and warrants to Mirna that as of the Effective Date:

(a) Rosetta is the co-exclusive owner of, or otherwise Controls pursuant to the Yeda Agreement, the Licensed Patents, all of which, to the best of its knowledge, are free and clear of any claims, liens, charges or encumbrances. For purposes of this Section 10.2(a), "Controls" means ability to grant to the other Party access to or a license under such item or right, as provided herein, without violating the terms of any agreement or other arrangements with any Third Party and without the prior consent of any Third Party.

(b) to Rosetta's knowledge, each Licensed Patent is in full force and effect;

(c) to its knowledge, the Licensed Patents issued and existing as of the Effective Date are valid and enforceable patents;

(d) (i) there are no agreements between Rosetta and any Third Party existing as of the Effective Date under which Rosetta obtains rights in or to any Licensed Patents, other

than the Yeda Agreement, a true and complete copy of which has been provided to Mirna, (ii) except as provided in the Yeda Agreement no Third Party has any right, title or interest in or to, or any license under, any Licensed Patents, (iii) no rights granted by or to Rosetta or its Affiliates under the Yeda Agreement conflict with any right or license granted to Mirna or its Affiliates hereunder, and (iv) Rosetta and its Affiliates are in compliance in all respects with the Yeda Agreement.

10.3. Rosetta Covenants. In addition to the covenants made by Rosetta elsewhere in this Agreement, Rosetta hereby covenants to Mirna that, from the Effective Date until expiration or termination of this Agreement, it will:

(a) not enter into any agreement with a Third Party that conflicts with or limits (i) the rights granted to Mirna hereunder or (ii) Rosetta's ability to fully perform its obligations hereunder;

(b) not amend, terminate or otherwise modify the Yeda Agreement or consent or waive rights with respect thereto in any manner that (i) conflicts or the rights granted to Mirna hereunder, or (ii) adversely impacts Rosetta's ability to fully perform its obligations hereunder; provided that in the event that Yeda terminates the License (as defined in the Yeda Agreement), except where such termination by Yeda arises directly or indirectly out of a breach by Mirna or its sublicensees of this Agreement or the Yeda Agreement, Rosetta hereby grants Mirna a worldwide, non-exclusive, transferable, assignable, with the right to authorize and grant Sublicenses in multiple tiers, to: (x) make, have made, use, offer for sale, sell and import Products that comprise or contain either the Current Compound or the Non-Exclusive Compounds and (y) perform processes covered by the Licensed Patents solely in connection with the activities permitted under subsection (b)(x).

(c) promptly furnish Mirna with copies of all amendments to the Yeda Agreement;

(d) fulfill, and cause its Affiliates to fulfill, all of their respective obligations under the Yeda Agreement so as not to be in breach of such agreement; and

(e) furnish Mirna with copies of all notices received by Rosetta or its Affiliates relating to any actual or alleged breach by Rosetta or its Affiliates under the Yeda Agreement, within [***] ([***]) Business Days after receipt thereof; and

(f) in the event that Rosetta receives a notice alleging a breach by Rosetta of the Yeda Agreement, and does not resolve any such actual or alleged breach as permitted thereunder, and where it would be possible for Mirna to effect a cure of such actual or alleged breach, notify Mirna within a sufficient period of time before the expiration of the cure period for such actual or alleged breach under the Yeda Agreement such that Mirna is able to cure or otherwise resolve such actual or alleged breach or default, and if Mirna makes any payments to any Third Party in connection with the cure or other resolution of such breach or default (except where the alleged breach of the Yeda Agreement was based on any breach of this Agreement or the Yeda Agreement by, or gross negligence or intentional misconduct of, Mirna or any of its

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Sublicensees) then Mirna may credit the amount of such payments against any royalties or other amounts payable to Rosetta pursuant to this Agreement.

10.4. DISCLAIMERS. EXCEPT AS EXPRESSLY SET FORTH HEREIN, ROSETTA AND ITS AFFILIATES DO NOT MAKE (EITHER EXPRESSLY OR IMPLIEDLY), AND EXPRESSLY DISCLAIM ALL, REPRESENTATIONS AND WARRANTIES RELATING TO THE LICENSED PATENTS OR THE PRODUCTS, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. WITHOUT LIMITING THE FOREGOING, (a) THE LICENSED PATENTS AND ALL INFORMATION PROVIDED BY ROSETTA TO MIRNA IS PROVIDED "AS-IS;" AND (b) ROSETTA AND ITS AFFILIATES DO NOT ASSUME ANY RESPONSIBILITIES OR MAKE ANY REPRESENTATION OR WARRANTIES WHATSOEVER WITH RESPECT TO MIRNA'S PRODUCTS, THE CONDUCT OF ANY PATENTED PROCESS BY MIRNA, ITS SUBLICENSEES OR CUSTOMERS, OR THAT THE CONDUCT OF THE PATENTED PROCESS WILL ACHIEVE ANY PARTICULAR RATE, COST OR QUALITY OF PRODUCTION, OR THAT THE PRODUCTS PRODUCED THEREWITH WILL MEET ANY PARTICULAR PERFORMANCE STANDARD.

10.5. Indemnification. In recognition of the fact that Rosetta and Yeda will have no control of the activities of Mirna or its Sublicensees under this Agreement, Mirna agrees, and shall cause its Sublicensees, to agree as follows:

(a) Mirna agrees to indemnify, defend and hold harmless Rosetta, Yeda, WIS, their Affiliates and their respective directors, officers and employees (hereinafter collectively the "Indemnitees") for any demands, liabilities, costs, losses, fines, damages or expenses (including legal costs and attorneys' fees) of whatever kind or nature ("Losses") arising from a claim, action or lawsuit or other proceeding ("Claim") that (i) is asserted by a third party and [***] in connection with the exercise of the rights and or the performance of the obligations of Mirna or any Sublicensee under this Agreement or any Sublicense Agreement, including the exercise of the License or any Sublicense, including [***] in connection with the development, manufacture, Sale or use of any of products or services by Mirna, any Sublicensee, or any Entity acting in the name of or on behalf of any of the foregoing, or [***], or [***] in connection with the exploitation or use by Mirna or any Sublicensee of the Licensed Patents or any data or results relating thereto; and (ii) any third party Claim that Rosetta is in breach of the Yeda Agreement that [***] arises out of a breach by Mirna or its sublicensees of this Agreement or the Yeda Agreement, except, in each case, to the extent caused by the gross negligence, recklessness or intentional acts of Rosetta or any Indemnitee or any material breach of a representation or warranty by Rosetta.

(b) Without limiting the generality of the foregoing, Mirna's indemnification under Section 10.5(a) shall extend to product liability claims and to Losses attributable to death, personal injury or property damage [***].

(c) Rosetta shall (i) promptly notify Mirna in writing of any claim or action triggering an indemnification obligation under this Section 10.5 after it becomes aware of the same; (ii) provide Mirna with such information and assistance as reasonably required in

connection therewith; and (iii) enable Mirna to assume and solely control any proceedings or negotiations related to such defense or settlement with its own counsel (except that no settlement of any such claim or action prejudicial to Rosetta's or Yeda's IP rights and/or requiring the Indemnitees to take or refrain from taking any action may be made without Rosetta's prior written consent); provided that any Indemnitee shall be entitled to be represented separately by counsel of the Indemnitee's choice and at its own expense. Further and without derogating from the foregoing, any compromise made by an Indemnitee without Mirna's prior written consent shall release Mirna of its obligation to indemnify the Indemnitee with respect to the compromised liability.

(d) Mirna shall at its own expense insure its liability pursuant to Section 10.5 during the period beginning on the date on which any clinical trials are undertaken in the development of Products and/or services utilizing the Licensed Patents shall first commence, and continuing during the entire period that the License is in force plus an additional period of [***] ([***]) years. Such insurance shall be in reasonable amounts and on reasonable terms in the circumstances, having regard, in particular, to the nature of the products and services sold under the License and shall be obtained from a reputable insurance company. The policy will name Rosetta as an additional insured. The policy or policies so issued shall include a "cross-liability" provision pursuant to which the insurance is deemed to be separate insurance for each named insured (without right of subrogation as against any of the insured under the policy, or any of their representatives, employees, officers, directors or anyone in their name). Mirna hereby undertakes to comply with all obligations imposed upon it under such policy or policies and in particular, without limiting the generality of the foregoing, to pay in full and all premiums and other payments for which it is liable pursuant to such policy or policies. Mirna shall be obliged to submit to Rosetta certificates of insurance within [***] ([***]) days of the date of issue of each such policy.

## 11. MISCELLANEOUS

11.1. Governing Law; Venue. This Agreement and any dispute between the Parties arising hereunder or relating hereto, including the interpretation thereof, the rights and obligations thereunder or compliance therewith (a "Dispute"), shall be governed by and construed in accordance with the laws of New York, U.S.A, exclusively, as such laws shall be in effect from time to time, without giving effect to any choice of law or conflict of law provision or rule that would cause the application of the laws of any other jurisdiction, provided that any Dispute as to the scope, validity, enforceability, infringement or ownership of any U.S. Licensed Patents shall be governed by the federal laws of the United States.

11.2. Dispute Resolution. Any dispute or controversy arising out of or in connection with this Agreement (each, a "Dispute") between the Parties shall be resolved in accordance with this Section 11.2.

(a) Escalation. Either Party may notify the other Party of the existence of a Dispute by written notice, specifying in reasonable detail the basis for such Dispute (a "Dispute Notice"). Promptly following the issuance of such notice, at least one senior representative of each Party shall meet to attempt to resolve the Dispute. If the Parties are unable to resolve the

Dispute within [***] days of the issuance of the Dispute Notice, either Party may commence litigation with respect to such Dispute.

11.3. Litigation. The state and federal courts located in New York, New York shall have exclusive jurisdiction to resolve any suit, action, proceeding or judgment relating to or arising out of this Agreement or any Dispute hereunder, and each Party hereby irrevocably submits to, and agrees not to object to, the jurisdiction of such courts and the appropriateness of such venue.

11.4. Injunctive Relief. Nothing in this Agreement shall limit the right of either Party to seek to obtain in any court of competent jurisdiction any equitable or interim relief or provisional remedy. Mirna hereby acknowledges that violation by it, its Affiliates or their respective officers, directors, employees, agents, or contractors of Sections 2 or 7.2 may cause Rosetta irreparable injury not compensable by money damages and for which Rosetta may not have an adequate remedy at law. Further, if Rosetta institutes an action or proceeding to enforce any provision of this Agreement and a court of competent jurisdiction determines that Rosetta is entitled to injunctive or other equitable relief as may be necessary to enjoin, prevent or curtail any breach thereof, threatened or actual, then Rosetta will be entitled to seek such relief without the posting of any bond or security. The foregoing will be in addition to and without prejudice to or limitation of any other rights Rosetta may have under this Agreement, at law or in equity, including the right to seek preliminary injunctive relief for violations of provisions of this Agreement other than those listed above.

11.5. Notices. Any and all notices, elections, offers, acceptances, approvals and demands permitted or required to be made under this Agreement (each a "Notice" or "notice") shall be in writing, signed by the Party giving such notice, election, offer, acceptance, approval or demand, and shall be delivered personally, or sent by registered or certified mail (including by overnight carrier), to the Party as follows:

If to Rosetta:

Rosetta Genomics Ltd.
10 Plaut St.
Rehovot, 7670609
Israel
Attn: Chief Executive Officer

With a copy to:

Brian Keane, Member
Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
One Financial Center,
Boston, MA 02111

If to Mirna:

Mirna Therapeutics, Inc.
2150 Woodward St., Suite 100
Austin, TX 78744

Attn: Chief Executive Officer

With a copy to:

Maya Skubatch
Wilson, Sonsini, Goodrich and Rosati
650 Page Mill Rd
Palo Alto, CA 94304

or as changed by written notice given by such Party. To the extent it is valid and complete, any such notice, statement or other communication shall be effective as of the date received, unless

[***] 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.

sent by overnight carrier, in which case it shall be effective the date mailed, as evidenced by the postal document received at the time of registration or certification.

11.6. Force Majeure. If the performance of any part of this Agreement by either Party, or of any obligation under this Agreement, is prevented, restricted, interfered with, or delayed by reason of any cause beyond the reasonable control of the Party liable to perform, unless conclusive evidence to the contrary is provided, the Party so affected shall, on giving written notice to the other Party, be excused from such performance to the extent of such prevention, restriction, interference, or delay. The foregoing shall in no event relieve Mirna of its obligation to timely pay in-full amounts due Rosetta in accordance with the terms of this Agreement.

11.7. Successors and Assigns.

(a) This Agreement and the related rights and obligations granted hereunder to Mirna are personal to Mirna and may not be sold, assigned, delegated or otherwise transferred or encumbered, in whole or in part, without the prior written consent of each of Rosetta and Yeda (such consent by Yeda to be sought and provided in accordance with Section 5.7.5 of the Yeda Agreement),. Mirna may seek the consent of Yeda directly, or may request that Rosetta solicit such consent from Yeda, in which case Rosetta will forward such request to Yeda within [***] of its receipt from Mirna. For the avoidance of doubt, for purposes of this, Agreement, a merger or consolidation of Mirna with a third party where Mirna is the surviving entity, or the acquisition of all or substantially all of the stock of control of Mirna, shall not be deemed an assignment and the prior consent of Rosetta or Yeda is not required for such transaction. Any transfer or assignment in violation of this Section 11.7(a) shall be null and void. This Agreement shall be binding on and shall inure to the benefit of the Parties, their respective successors, successors in title, and permitted assigns, and each Party agrees, on behalf of it, its successors, successors in title, and permitted assigns, to execute any instruments that may be necessary or appropriate to carry out and execute the purpose and intentions of this Agreement and hereby authorizes and directs its successors, successors in title, and assigns to execute any and all such instruments. Each and every successor in interest to any Party shall hold such interest subject to all of the terms and provisions of this Agreement. For the avoidance of doubt, nothing hereunder limits Rosetta from assigning this Agreement.

(b) If (i) Mirna desires to assign this Agreement to a successor to all or substantially all of Mirna's assets to which this Agreement relates, including any assignment of Mirna's rights in the Product, whether by merger, asset sale, or otherwise, (ii) [***], and (iii) [***], then, upon Mirna's written request, (A) [***] and (B) [***] (provided that if Mirna paid any amounts under this Agreement for fees or milestone payments, such amounts shall not be payable by Mirna's successor).

11.8. Bankruptcy. All rights and licenses granted under this Agreement are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the United States Bankruptcy Code (the "Bankruptcy Code"), licenses to rights to "intellectual property" as defined in Section 11 U.S.C. § 101(56) of the Bankruptcy Code. The Parties agree that Section 11 U.S.C. 365 of the Bankruptcy Code is applicable to this Agreement, and that, if Rosetta, as debtor in possession, or a trustee in bankruptcy for Rosetta, in a case under the Bankruptcy Code rejects this Agreement,

[***] 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.

Mirna may elect to retain its licensee rights under this Agreement as provided for in Section 365(n) of the Bankruptcy Code over Rosetta, as applicable, or the trustee in such circumstances, in each case as provided in Section 365(n). In the event that this Agreement or the licenses granted hereunder should ever become subject to future United States bankruptcy proceeding, Rosetta hereby agrees to waive the provisions of Section 365(c) of the Bankruptcy Code and applicable non-bankruptcy law to the extent such law could operate to prevent Mirna, as a debtor in United States bankruptcy cases and in its capacity as a licensee of intellectual property, from assuming the Agreement. Provided that the conditions for assumption under Section 365(b) of the Bankruptcy Code are satisfied (or waived by the appropriate parties at the time of the proposed assumption), and the sole impediment to assumption is the operation of Section 365(c) of the Bankruptcy Code, Rosetta hereby irrevocably consents to the assumption by Mirna of the Agreement, notwithstanding the filing of any bankruptcy case in respect of Mirna, as the case may be, and the provisions of Section 365(c) of the Bankruptcy Code, to the extent such law could operate to restrict assumption Mirna's license rights under this Agreement. Under no circumstances should the foregoing waiver and consent be deemed a waiver or consent to the assignment of this Agreement to any Third Party by either Mirna or Rosetta.

11.9. Entire Agreement, Amendments. This Agreement, including all Schedules hereto, constitutes the entire agreement between the Parties with respect to the subject matter hereof, and supersedes all prior agreements, understandings, and communications between the Parties, whether oral or written, relating to such subject matter. No change, modification, or amendment of this Agreement shall be valid or binding on the Parties unless such change or modification shall be in writing signed by duly authorized representatives of both Parties.

11.10. Further Assurances. Each Party hereby covenants and agrees that it shall execute and deliver such deeds and other documents as may be required to implement any of the provisions of this Agreement.

11.11. No Waiver. Any waiver under this Agreement shall be in writing. The failure of either Party to enforce, at any time, or for any period of time, any provision of this Agreement, shall not be construed to be a waiver of such provision, or in any way affect the validity of this Agreement, or any part thereof, or the right of any Party thereafter to enforce each and every such provision.

11.12. Severability. If any provision of this Agreement should become fully or partially invalid or unenforceable for any reason whatsoever, or violate any applicable law, this Agreement is to be considered divisible as to such provision and such provision deleted from this Agreement, and the remainder of this Agreement shall be valid and binding as if such provision were not included herein. A new provision shall be substituted for any such deleted prevision which shall come as close to what the Parties intended, as far as legally possible, according to the sense and purpose of this Agreement.

11.13. Costs and Expenses. Unless otherwise expressly provided in this Agreement, each Party shall bear all fees and expenses incurred in performing its obligations under this Agreement.

11.14. Independent Contractors. This Agreement is not intended to create, and shall not be interpreted or construed as creating a partnership, joint venture, agency, employment, master and servant, or similar relationship between Rosetta and Mirna, and no representation to the contrary shall be binding upon Rosetta. Neither Party shall be considered an agent or employee of the other. Neither Party has the right or power, express or implied, to make any commitments of any kind on behalf of the other Party without prior written consent of the other Party.

11.15. Non-Disparagement. The Parties agree that neither will disparage the other Party nor their respective Affiliates, nor any of their respective officers, directors, employees or contractors with respect to the matters relating to or arising from the matter hereunder of the settlement of a Claim or this Agreement.

11.16. Counterparts. This Agreement may be executed in multiple copies, each of which is deemed an original, but all of which constitute one and the same agreement, binding on the Parties, and each Party hereby covenants and agrees to execute all duplicates or replacement counterparts of this Agreement as may be required. Delivery of an executed counterpart of this Agreement by facsimile or other electronic transmission will be as effective as physical delivery of a manually executed counterpart and copies of executed signature pages shall be binding as originals.

[REMAINDER OF PAGE INTENTIONALLY BLANK]

IN WITNESS WHEREOF, each of the Parties hereto has caused this Agreement to be executed by its duly authorized officer or representative set forth below as of the Effective Date:

| **ROSETTA GENOMICS LTD.** | | **MIRNA THERAPEUTICS, INC.** | |
|---|---|---|---|
| By: | /s/ Kenneth A. Berlin | By: | /s/ Paul Lammers |
| Name: | Kenneth A. Berlin | Name: | Dr. Paul Lammers |
| Title: | President and CEO | Title: | President and CEO |
| Date: | December 31, 2015 | Date: | December 31, 2015 |

**SCHEDULE A**
**LICENSED PATENTS**

| Jurisdiction | Application No. | Filing Date | Issue Date | Patent 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.

**SCHEDULE B**

Sequence for Current Compound:

| | |
|---|---|
| Active: | [***] |
| Passenger: | [***] |

Where [***].

[***] 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.

**SCHEDULE C**

Nucleic acid sequence[1]:

[***] or

[***]

1 This Schedule is also reference for Mimetic of miR-34a definition.

[***] 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 23.1**

**Consent of Independent Registered Public Accounting Firm**

We consent to the incorporation by reference in the Registration Statement on Form S-8 (Nos. 333-207299) pertaining to the 2008 Long Term Incentive Plan, 2015 Equity Incentive Plan and 2015 Employee Stock Purchase Plan of Mirna Therapeutics, Inc. of our report dated March 29, 2016, with respect to the financial statements of Mirna Therapeutics, Inc., included in this Annual Report (Form 10-K) for the year ended December 31, 2015, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Austin, Texas
March 29, 2016

**Exhibit 31.1**

**CERTIFICATION OF THE CHIEF EXECUTIVE OFFICER**
**PURSUANT TO**
**SECURITIES EXCHANGE ACT RULES 13A-14(A) AND 15D-14(A)**

I, Paul Lammers, certify that:

1. I have reviewed this Annual Report on Form 10-K of Mirna Therapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 29, 2016

/s/ Paul Lammers
Paul Lammers, M.D., M.Sc.
Chief Executive Officer
(Principal Executive Officer)

**Exhibit 31.2**

**CERTIFICATION OF THE CHIEF FINANCIAL OFFICER**
**PURSUANT TO**
**SECURITIES EXCHANGE ACT RULES 13A-14(A) AND 15D-14(A)**

I, Alan Fuhrman, certify that:

1. I have reviewed this Annual Report on Form 10-K of Mirna Therapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 29, 2016

/s/ Alan Fuhrman

Alan Fuhrman
Chief Financial Officer
(Principal Financial Officer)

**Exhibit 32.1**

**CERTIFICATION PURSUANT TO**
**18 U.S.C. SECTION 1350,**
**AS ADOPTED PURSUANT TO**
**SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Mirna Therapeutics, Inc. (the "Company") on Form 10-K for the fiscal year ended December 31, 2015, as filed with the Securities and Exchange Commission (the "Report"), Paul Lammers, Chief Executive Officer of the Company, and Alan Fuhrman, Chief Financial Officer of the Company, respectively, do each hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

- The information in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 29, 2016

/s/ Paul Lammers
Paul Lammers, M.D., M.Sc.
Chief Executive Officer
(Principal Executive Officer)

/s/ Alan Fuhrman
Alan Fuhrman
Chief Financial Officer
(Principal Financial Officer)