

August 24, 2015

VIA EDGAR AND FEDERAL EXPRESS

United States Securities and Exchange Commission
Division of Corporation Finance
100 F Street, N.E.
Washington, D.C. 20549-6010

Attention: Jeffrey P. Riedler, Assistant Director
Austin Stephenson
Bryan Pitko
Ibolya Ignat
Jim Rosenberg

File No. 053734-0005

Re: **Mirna Therapeutics, Inc.**
Registration Statement on Form S-1
Filed on August 24, 2015
CIK No. 0001527599

Ladies and Gentlemen:

On behalf of Mirna Therapeutics, Inc. (the "**Company**"), we are hereby filing a Registration Statement on Form S-1 (the "**Registration Statement**"). The Company most recently submitted a Draft Registration Statement on Form S-1 on July 15, 2015 (the "**Draft Submission**") to the U.S. Securities and Exchange Commission (the "**Commission**") on a confidential basis. The Registration Statement has been revised to reflect the Company's responses to the comment letter to the Draft Submission received on August 12, 2015 from the staff of the Commission (the "**Staff**"). For your convenience, we are providing by overnight delivery a courtesy package that includes ten copies of the Registration Statement, five of which have been marked to show changes from the Draft Submission, as well as copy of this letter.

For ease of review, we have set forth below each of the numbered comments of your letter in bold type followed by the Company's responses thereto.

Prospectus Summary, page 1

- 1. We refer to your product pipeline table on pages 1 and 87 and specifically to your indication that several of the programs related to undisclosed microRNA. Please revise your pipeline table to identify each undisclosed microRNA and therapeutic category. Unless a therapeutic category and a compound have been identified, the product appears too preliminary for inclusion in the table. Accordingly, please identify the target microRNA and therapeutic category in the table or alternately, eliminate these candidates from the table.**

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Response: In response to the Staff's comment, the Company has revised the pipeline table on pages 1 and 87 of the Registration Statement.

Stock-Based Compensation, page 79

- 2. We may have additional comments on your accounting for equity issuances including stock compensation and beneficial conversion features. Once you have an estimated offering price, please provide us an analysis explaining the reasons for the differences between recent valuations of your common stock leading up to the IPO and the estimated offering price.**

Response: In response to the Staff's comment, the Company confirms that it will provide to the Staff the requested analysis under separate supplemental cover.

Business

MRX34 Clinical Development Program, page 99

- 3. Please revise your disclosure in this section to disclose the initial filing date of your IND and a description of the approved Phase 1 trial by the FDA and any subsequent amendment(s) to the trial protocol.**

Response: In response to the Staff's comment, the Company has revised page 99 of the Registration Statement.

Our Patent Portfolio, page 108

4. **Please revise your disclosure to specify when the patents licensed from Yale with respect to the uses of let-7 microRNA are expected to expire.**

Response: In response to the Staff's comment, the Company has revised page 113 of the Registration Statement.

Strategic Partnerships and Collaborations, page 120

5. **We refer to your last risk factor on page 45 and note that you highlight a license from Merck as important to your business. We also note your cross-reference to the disclosure under the heading "Business—Strategic Partnerships and Collaborations" for a full description of the Merck agreement including the material terms and obligations, and termination provisions. The disclosure appearing under this heading does not appear to include any information concerning the Merck agreement. Accordingly, please revise this section to disclose the material terms and obligations of your agreement with Merck. In addition, please file the agreement as an exhibit to the registration statement.**

Response: In response to the Staff's comment, the Company respectfully notes to the Staff that the reference to the Merck agreement was included erroneously. Accordingly, the Company has revised page 45 of the Registration Statement.

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Exhibit Index

6. **Please file your sublease and the amended service agreement with Asuragen as an exhibit to your Form S-1 in accordance with Item 601 of Regulation S-K.**

Response: In response to the Staff's comment, the Company has filed the sublease and the amended service agreement with Asuragen as Exhibits 10.11, 10.1(A) and 10.1(B), respectively, to the Registration Statement.

* * *

We hope the foregoing answers are responsive to your comments. Please do not hesitate to contact me by telephone at (650) 463-3043 or by fax at (650) 463-2600 with any questions or comments regarding this correspondence.

Very truly yours,

/s/ Mark V. Roeder

Mark V. Roeder
of LATHAM & WATKINS LLP

cc: Paul Lammers, M.D., M.Sc., Mirna Therapeutics, Inc.
Jon Irvin, Mirna Therapeutics, Inc.
Scott D. Elliot, Esq., Ropes & Gray LLP
Patrick O'Brien, Esq., Ropes & Gray LLP
