



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

DIVISION OF
CORPORATION FINANCE

Mail Stop 4720

August 12, 2015

Via E-mail

Paul Lammers, M.D., M.Sc.
President and Chief Executive Officer
Mirna Therapeutics, Inc.
2150 Woodward Street, Suite 100
Austin, TX 78744

**Re: Mirna Therapeutics, Inc.
Amendment No. 4 to Draft Registration Statement on Form S-1
Submitted July 15, 2015
CIK No. 0001527599**

Dear Dr. Lammers:

We have reviewed your amended draft registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by providing the requested information and either submitting an amended draft registration statement or publicly filing your registration statement on EDGAR. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing the information you provide in response to these comments and your amended draft registration statement or filed registration statement, we may have additional comments.

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.

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.

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.

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

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.

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.

Paul Lammers, M.D., M.Sc.
Mirna Therapeutics, Inc.
August 12, 2015
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You may contact Sasha Parikh at (202) 551-3627 or Jim Rosenberg at (202) 551-3679 if you have questions regarding comments on the financial statements and related matters. Please contact Tara Keating Brooks at (202) 551-8336, Bryan Pitko at (202) 551-3203, or me at (202) 551-3715 with any other questions.

Sincerely,

/s/ Bryan J. Pitko for

Jeffrey P. Riedler
Assistant Director
Office of Healthcare and Insurance

cc: Via E-mail
Mark V. Roeder
Latham & Watkins LLP