



DIVISION OF
CORPORATION FINANCE

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

May 6, 2014

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. 2 to Draft Registration Statement on Form S-1
Submitted April 22, 2014
CIK No. 0001527599**

Dear Dr. Lammers:

We have reviewed your amended confidential draft registration statement and have the following additional 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 confidential 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 confidential draft registration statement or filed registration statement, we may have additional comments.

Use of Proceeds, page 63

1. Please revise your disclosure to allocate the amount of proceeds from the offering you will use:
 - To complete the Phase 1 clinical trial for unresectable primary liver cancer or metastatic solid tumors with liver involvement;
 - To complete the Phase 1 clinical trial cohort for hematological malignancies;
 - To initiate the Phase 2 clinical trial for unresectable primary liver cancer or metastatic solid tumors with liver involvement; and
 - To initiate the Phase 2 clinical trial cohort for hematological malignancies.

Please make any necessary conforming changes to your Prospectus Summary as well.

Results of Operations
Comparison of Years Ended December 31, 2011 and 2012
Research and Development Expenses, page 78

2. Please refer to your response to prior comment 17.
 - Your disclosure that provides several reasons for the \$3.1 million increase in 2012 is vague. Based on the information you provide in the table in your response, the increase appears to be substantively due to the increases in fees for contract research associations and other external costs. Revise your disclosure to quantify the changes in each of these two categories and to explain the reason for the increase in each category.
 - In the asterisk to the table in your response, you indicate that cost reimbursements are not earned until the cost is paid by the Company. Clarify under research and development costs in Note 2. Summary of Significant Accounting Policies in your notes to financial statements, where you indicate that the proceeds from government grants are accounted for as a reduction of research and development expenses, whether you recognize the proceeds at the time you pay the cost or when the reimbursement is received.

Business
MRX34 Clinical Development Program, page 98

3. We note your response to our prior comment 12 and your revised disclosure that some of the adverse events reported “were characterized as severe and related to the administration of MRX34.” Please disclose what the serious adverse events were, and disclose the exact number of patients who experienced serious adverse events which were determined to be related to treatment. Please include similarly specific disclosure in the risk factor on page 50.

If you intend to respond to these comments with an amended draft registration statement, please submit it and any associated correspondence in accordance with the guidance we provide in the Division’s October 11, 2012 announcement on the SEC website at <http://www.sec.gov/divisions/corpfin/cfannouncements/drsfilingprocedures101512.htm>.

Please keep in mind that we may publicly post filing review correspondence in accordance with our December 1, 2011 policy (<http://www.sec.gov/divisions/corpfin/cfannouncements/edgarcorrespondence.htm>). If you intend to use Rule 83 (17 CFR 200.83) to request confidential treatment of information in the correspondence you submit on EDGAR, please properly mark that information in each of your confidential submissions to us so we do not repeat or refer to that information in our comment letters to you.

Paul Lammers, M.D., M.Sc.
Mirna Therapeutics, Inc.
May 6, 2014
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You may contact Ibolya Ignat at (202) 551-3656 or Jim Rosenberg at (202) 551-3679 if you have questions regarding comments on the financial statements and related matters. Please contact Austin Stephenson at (202) 551-3192, 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

cc: Via E-mail
Alan C. Mendelson, Esq.
Latham & Watkins LLP