



DIVISION OF
CORPORATION FINANCE

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

Mail Stop 4546

October 5, 2016

Via E-mail

Douglas A. Treco, Ph.D.
President and Chief Executive Officer
Ra Pharmaceuticals, Inc.
87 Cambridge Park Drive
Cambridge, MA 02140

**Re: Ra Pharmaceuticals, Inc.
Amendment No. 1 to
Draft Registration Statement on Form S-1
Submitted September 23, 2016
CIK No. 0001481512**

Dear Dr. Treco:

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.

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1. We note your response to comment 5. Please revise your disclosure to indicate that you are unable to estimate the amounts you intend to allocate to rMG and LN because you have not conducted separate clinical trials and have not received FDA guidance regarding trial design.
2. Please further expand the discussion to indicate that you have not conducted separate preclinical studies or received FDA feedback related to your pipeline programs and therefore it is difficult to forecast future expenditures on a program by program basis or how far the proceeds will enable to get in the development of these products.

Business

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3. We note your response to comment 4 and 8. However, your statement that the technology underpinning the Extreme Diversity Platform stems in part from licenses to patents from Cosmix and Dr. A.C. Forster appears to imply that the Extreme Diversity Platform is dependent on these licenses. The presences or absence of royalties is not determinative. Please file the agreements as exhibits or provide us with an analysis supporting your determination that the licensed patents are not necessary for the Extreme Diversity Platform. Your analysis should indicate whether alternative technology is available or any other factors that are relevant to the operation of the Extreme Diversity Platform and further explain how the licensed technology underpins the Extreme Diversity Platform without it being necessary to the functioning of the Platform.
4. We note your response to comment 12 and continue to believe that further information about your licensing agreements is material. To the extent your Extreme Diversity Platform is dependent on the technology licensed to you in pursuant to the Dr. A. C. Forester and Cosmix license agreements, we consider further information about the agreement material. Please provide a more fulsome discussion of the agreements, including amounts paid under the agreement and other payment obligations, expiration and termination provisions. Please note, if either of the agreements licenses technology that is necessary for the function of the Extreme Diversity Platform, then we will consider the license to be material. The level of protection the patents provide is not determinative of the agreements' materiality.

You may contact Sasha Parikh at (202) 551-3627 or Lisa Vanjoske at (202) 551-3614 if you have questions regarding comments on the financial statements and related matters. Please contact Scot Foley at (202) 551-3383 or me at (202) 551-3675 with any other questions.

Sincerely,

/Suzanne Hayes

Suzanne Hayes
Assistant Director

cc: Kingsley L. Taft, Esq.
Goodwin Procter LLP