



DIVISION OF
CORPORATION FINANCE

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

December 17, 2013

Via E-mail

Pratik Shah, Ph.D.
President and Chief Executive Officer
Auspex Pharmaceuticals, Inc.
3366 N. Torrey Pines Court, Suite 225
San Diego, California 92037

**Re: Auspex Pharmaceuticals, Inc.
Draft Registration Statement on Form S-1
Submitted November 21, 2013
CIK No. 0001454189**

Dear Dr. Shah:

We have reviewed your 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.

General

1. Please file all exhibits as soon as practicable. We may have further comments upon examination of these exhibits.
2. Please provide us proofs of all graphic, visual or photographic information you will provide in the printed prospectus prior to its use, for example in a preliminary prospectus. Please note that we may have comments regarding this material.
3. Please supplementally provide us with any written materials that you or anyone authorized to do so on your behalf provides in reliance on Section 5(d) of the Securities Act to potential investors that are qualified institutional buyers or institutional accredited investors. Similarly, please supplementally provide us with any research reports about you that are published or distributed in reliance upon Section 2(a)(3) of the Securities Act

of 1933 added by Section 105(a) of the Jumpstart Our Business Startups Act by any broker or dealer that is participating or will participate in your offering.

Table of Contents, page i

4. Please remove the sentence stating that “industry publications and third-party research, surveys and studies generally indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information.” It is not appropriate to directly or indirectly disclaim liability for information in the registration statement.

Prospectus Summary
Our Company, page 1

5. Please define orphan diseases the first time this term is used, and state for which of the three indications, chorea associated with Huntington’s disease, tardive dyskinesia, or Tourette syndrome, you intend to apply for orphan designation for SD-809.
6. Please revise your disclosure to define deuterium the first time this term is used.

Additional Product Candidates, page 3

7. Please clarify the clinical status of SD-560, SD 970, and SD-900. Additionally, please state if any of these products are in the preclinical phase.

Risk Factors

We may experience delays in the commencement or completion of our clinical trials . . . , page 14

8. Please expand your disclosure to summarize the financial arrangements that you have with certain investigators and how this could impact the FDA’s review of your NDA.

We may not obtain orphan drug designation for SD-809 . . . , page 16

9. We note on page 17 that you do not intend to test SD-809 against Xenazine in your ongoing Phase 3 clinical trials, and on page 83 that you will not be able to make direct comparative claims regarding the safety and efficacy of SD-809 and tetrabenazine. Please explain on pages 16 and 82 how you intend to both present a plausible hypothesis of clinical superiority and demonstrate clinical superiority of SD-809 compared to Xenazine. Additionally, please clarify if you would need to demonstrate clinical superiority as compared to Xenazine to obtain orphan status after the period of market exclusivity related to Xenazine’s orphan drug status expires.

If we are not successful in attracting and retaining highly qualified personnel . . . , page 24

10. Please revise your disclosure to discuss departures that may have affected your business.

Use of Proceeds, page 43

11. We note that you are planning to (i) initiate the First-HD and ARC-HD trials and then submit an NDA for SD-809 for the treatment of chorea in Huntington's patients to the FDA in the fourth quarter of 2014, (ii) seek regulatory approval for SD-809 in foreign jurisdictions, (iii) initiate a Phase 2/3 efficacy clinical trial of SD-809 for the treatment of tardive dyskinesia, (iv) and initiate a Phase 1b clinical trial of SD-809 for the treatment of tics associated with Tourette syndrome. Please amend your disclosure to include the estimated amount of proceeds you plan to allocate for each of these uses, and expand your disclosure to identify the stage of each trial or regulatory process that you expect to reach using the allocated proceeds. Additionally, if you expect the proceeds will be used for clinical studies related to SD-560, SD-970, or SD-900, please make corresponding disclosures.

Management's Discussion and Analysis of Financial Condition and Results of Operations
Research and Development Expenses, page 52

12. Please expand your disclosures to include the total costs incurred during each period presented and to date for each key research and development project.

Stock-Based Compensation, page 54

13. We may have additional comments on your accounting for stock compensation and related disclosure once you have disclosed an estimated offering price. Please provide quantitative and qualitative disclosures explaining the difference between the estimated offering price and the fair value of each equity issuance.

Business, page 69

14. Please amend your disclosure to describe the INDs submitted for SD-809 and SD-254 by indication and disclose when these INDs were filed and by whom.

Intellectual Property and Exclusivity, page 85

15. We note on page 1 that you refer to your deuterium technology. Please expand your disclosure to explain any specific or proprietary technology that you rely on to make these chemical modifications and any patents that cover this technology generally.

16. We note on page 85 that your policy is to actively seek to protect your proprietary position in Canada. We also note your summary of your U.S. patent for SD-809 on page 86. Please provide similar information with respect to your Canadian patents.
17. We note that you have other programs on page 84. Please expand your disclosure to provide a breakdown of your patents for your other programs that is similar to your disclosure for the patents covering SD-809.

Executive and Director Compensation
Agreements with our Named Executive Officers, page 109

18. Please clarify that the employment agreements with your named executive officers are “at will.”

Principal Stockholders, page 127

19. We note that Alex Zisson is a beneficial owner of TMP and has voting and investment power over the securities held by TMP. Please revise your disclosure to include the 224,098 shares of common stock issuable upon conversion of convertible preferred stock and 20,630 shares of common stock issuable upon the exercise of convertible preferred stock warrants, assuming the conversion of all outstanding warrants to purchase shares of your convertible preferred stock into warrants to purchase shares of our common stock held by TMP Nominee II, LLC, or TMPN II as shares beneficially owned by Alex Zisson. Additionally, please expand the footnote disclosure to clarify that these shares are included in Alex Zisson’s beneficial ownership.

Shares Eligible for Future Sale, page 135

20. Once available please file copies of each of the lock-up agreements.

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.

Pratik Shah, Ph.D.
Auspex Pharmaceuticals, Inc.
December 17, 2013
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You may contact Scott Wuenschell at (202) 551-3467 or Mark Brunhofer at (202) 551-3638 if you have questions regarding comments on the financial statements and related matters. Please contact Matthew Jones at (202) 551-3786 or me at (202) 551-3715 with any other questions.

Sincerely,

/s/ Jeffrey P. Riedler

Jeffrey P. Riedler
Assistant Director

cc: Frederick Muto, Esq.
Cooley LLP
4401 Eastgate Mall
San Diego, California 92121