



DIVISION OF
CORPORATION FINANCE

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

May 10, 2017

David Lowe
President and Chief Executive Officer
Aeglea BioTherapeutics, Inc.
901 S. MoPac Expressway
Barton Oaks Plaza One, Suite 250
Austin, TX 78746

Re: Aeglea BioTherapeutics, Inc.
Registration Statement on Form S-3
Filed May 1, 2017
File No. 333-217573

Dear Dr. Lowe:

We have limited our review of your registration statement to those issues we have addressed in our 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 amending your registration statement and providing the requested information. 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 any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Registration Statement on Form S-3

Cover Page

1. It appears that you are relying on General Instruction I.B.6 of Form S-3. If true, please revise your sales agreement prospectus cover page to disclose the calculation of the aggregate market value of your outstanding voting and nonvoting common equity and the amount of all securities offered pursuant to General Instruction I.B.6 during the prior 12 calendar month period that ends on, and includes, the date of the prospectus. Refer to Instruction 7 to General Instruction I.B.6. Otherwise, please provide us your analysis demonstrating your eligibility to use Form S-3.

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We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Refer to Rules 460 and 461 regarding requests for acceleration. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

Please contact Dorrie Yale at 202-551-8776 or Erin Jaskot, Special Counsel, at 202-551-3442 with any questions.

Division of Corporation Finance
Office of Healthcare & Insurance

cc: Robert A. Freedman