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**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

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**FORM 8-A**

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**FOR REGISTRATION OF CERTAIN CLASSES OF SECURITIES  
PURSUANT TO SECTION 12(b) OR 12(g) OF  
THE SECURITIES EXCHANGE ACT OF 1934**

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**RHYTHM PHARMACEUTICALS, INC.**

(Exact name of registrant as specified in its charter)

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**Delaware**  
(State of incorporation or organization)

**46-2159271**  
(I.R.S. Employer Identification No.)

**500 Boylston Street, 11th Floor**  
**Boston, MA**  
(Address of principal executive offices)

**02116**  
(Zip Code)

**Securities to be registered pursuant to Section 12(b) of the Act:**

| Title of each class<br>to be so registered | Name of each exchange on which<br>each class is to be registered |
|--|--|
| Common Stock, \$0.001 par value            | The NASDAQ Stock Market LLC                                      |

If this form relates to the registration of a class of securities pursuant to Section 12(b) of the Exchange Act and is effective pursuant to General Instruction A. (c) or (e), check the following box.

If this form relates to the registration of a class of securities pursuant to Section 12(g) of the Exchange Act and is effective pursuant to General Instruction A. (d) or (e), check the following box.

If this form relates to the registration of a class of securities concurrently with a Regulation A offering, check the following box.

Securities Act registration statement or Regulation A offering statement file number to which this form relates:  
**333-220337 (if applicable)**

Securities to be registered pursuant to Section 12(g) of the Act:  
**None**

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**Item 1. Description of Registrant's Securities to be Registered.**

A description of the common stock, par value \$0.001 per share, to be registered hereunder is set forth under the caption "Description of Capital Stock" in the prospectus that constitutes a part of the Registrant's Registration Statement on Form S-1, File No. 333-220337 (the "Registration Statement"), initially filed with the U.S. Securities and Exchange Commission on September 5, 2017, as subsequently amended by any amendments to such Registration Statement and by any form of prospectus filed pursuant to Rule 424(b) under the Securities Act of 1933, as amended, in connection with such Registration Statement. Such Registration Statement, as amended, and any form of prospectus filed pursuant to Rule 424(b) under the Securities Act of 1933, as amended, that includes such description, are hereby incorporated by reference herein.

**Item 2. Exhibits.**

Under the Instructions as to Exhibits with respect to Form 8-A, no exhibits are required to be filed because no other securities of the Registrant are registered on The NASDAQ Stock Market LLC and the securities registered hereby are not being registered pursuant to Section 12(g) of the Securities Exchange Act of 1934, as amended.

**SIGNATURE**

Pursuant to the requirements of Section 12 of the Securities Exchange Act of 1934, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereto duly authorized.

**RHYTHM PHARMACEUTICALS, INC.**

Date: September 29, 2017

By: /s/ Keith Gottesdiener  
Name: Keith Gottesdiener  
Title: Chief Executive Officer

*[Rhythm Pharmaceuticals, Inc. — Signature Page to Form 8-A]*