

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

**FORM S-8**

**REGISTRATION STATEMENT  
Under  
The Securities Act of 1933**

**RA PHARMACEUTICALS, INC.**

(Exact name of registrant as specified in its charter)

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

**26-2908274**  
(I.R.S. Employer  
Identification Number)

**87 Cambridge Park Drive  
Cambridge, MA 02140  
(617) 401-4060**

(Address of Principal Executive Offices)

**Ra Pharmaceuticals, Inc. 2016 Stock Award and Incentive Plan  
Ra Pharmaceuticals, Inc. 2016 Employee Stock Purchase Plan**  
(Full Title of the Plans)

**Douglas A. Treco, Ph.D.  
President and Chief Executive Officer  
87 Cambridge Park Drive  
Cambridge, MA 02140  
(617) 401-4060**

(Name, address, including zip code, and telephone number, including area code, of agent for service)

**Copies to:**

**Kingsley L. Taft, Esq.  
Robert E. Puopolo, Esq.**  
Goodwin Procter LLP  
100 Northern Avenue  
Boston, Massachusetts 02210  
(617) 570-1000

**David C. Lubner**  
Executive Vice President  
and Chief Financial Officer  
Ra Pharmaceuticals, Inc.  
87 Cambridge Park Drive  
Cambridge, Massachusetts 02140  
(617) 401-4060

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer  Accelerated filer   
Non-accelerated filer  (Do not check if a smaller reporting company) Smaller reporting company   
Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. Yes  No

**CALCULATION OF REGISTRATION FEE**

Title of Securities to be Registered	Amount to be Registered(1)	Proposed Maximum Offering Price per Share	Proposed Maximum Aggregate Offering Price	Amount of Registration Fee
Common Stock, \$0.001 par value per share	901,846 shares(2)	\$ 22.37(3)	\$ 20,174,295	\$ 2,338
Common Stock, \$0.001 par value per share	225,461 shares(4)	\$ 19.01(5)	\$ 4,286,014	\$ 497
<b>Total</b>	<b>1,127,307 shares</b>		<b>\$ 24,460,309</b>	<b>\$ 2,835</b>

(1) Pursuant to Rule 416 under the Securities Act of 1933, as amended (the "Securities Act"), this Registration Statement shall also cover any additional shares of common stock which become issuable under the above-named plans by reason of any stock dividend, stock split, recapitalization or any other similar transaction effected without the receipt of consideration which results in an increase in the number of our outstanding shares of common stock. Pursuant to Rule 416(c) under the Securities Act, this Registration Statement shall also cover an indeterminate amount of interests to be offered or sold pursuant to the employee stock purchase plan described herein.

(2) Represents an automatic annual increase on January 1, 2017 to the number of shares of common stock reserved for issuance under the 2016 Stock Award and Incentive Plan (the "2016 Plan") pursuant to the terms of the 2016 Plan. Shares available for issuance under the 2016 Plan were previously registered on a registration statement on Form S-8 filed with the Securities and Exchange Commission on October 26, 2016 (Registration No. 333-214244).

(3) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457 of the Securities Act, and based on \$22.37 per share, which represents the average of the high and low prices reported on the Nasdaq Global Market on May 5, 2017.

(4) Represents an automatic annual increase on January 1, 2017 to the number of shares of common stock reserved for issuance under the 2016 Employee Stock Purchase Plan (the

"2016 ESPP") pursuant to the terms of the 2016 ESPP. Shares available for issuance under the 2016 ESPP were previously registered on a registration statement on Form S-8 filed with the Securities and Exchange Commission on October 26, 2016 (Registration No. 333-214244).

- (5) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457 of the Securities Act, and based on 85% of \$22.37 per share, which represents the average of the high and low prices reported on the Nasdaq Global Market on May 5, 2017. Pursuant to the 2016 ESPP, the purchase price of the shares of common stock reserved for issuance thereunder will be 85% of the fair market value of a share of common stock on the first trading day of the offering period or on the exercise date, whichever is less.
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## EXPLANATORY NOTE

This Registration Statement on Form S-8 registers additional shares of Common Stock under the Registrant's 2016 Plan and the 2016 ESPP.

The number of shares of Common Stock reserved and available for issuance under the 2016 Plan is subject to an automatic annual increase on each January 1, beginning in 2017, by an amount equal to the lesser of (i) 4.0% of the number of shares of common stock issued and outstanding on the immediately preceding December 31, (ii) 2,000,000 shares or (iii) such amount as determined by the Administrator (as defined in the 2016 Plan), currently the Compensation Committee of the Registrant's Board of Directors. Accordingly, on January 1, 2017, the number of shares of Common Stock reserved and available for issuance under the 2016 Plan increased by 901,846 shares.

The number of shares of Common Stock reserved and available for issuance under the 2016 ESPP is subject to an automatic annual increase on each January 1, beginning in 2017, by an amount equal to the lesser of (i) 1.0% of the number of shares of common stock issued and outstanding on the immediately preceding December 31, (ii) 300,000 shares or (iii) such amount as determined by the Administrator (as defined in the 2016 ESPP), currently the Compensation Committee of the Registrant's Board of Directors. Accordingly, on January 1, 2017, the number of shares of Common Stock reserved and available for issuance under the 2016 ESPP increased by 225,461 shares.

This Registration Statement registers these additional 1,127,307 shares of Common Stock. The additional shares are of the same class as other securities relating to the 2016 Plan and the 2016 ESPP for which our registration statement filed on Form S-8 (Registration No. 333-214244) on October 26, 2016, is effective. The information contained in our registration statement on Form S-8 (Registration No. 333-214244) is hereby incorporated by reference pursuant to General Instruction E.

## Part II

### INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

#### Item 8. Exhibits.

See the Exhibit Index on the page immediately preceding the exhibits for a list of exhibits filed as part of this registration statement, which Exhibit Index is incorporated herein by reference.

## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Cambridge, Commonwealth of Massachusetts, on the 11th day of May, 2017.

### RA PHARMACEUTICALS, INC.

By: /s/ Douglas A. Treco  
Douglas A. Treco, Ph.D.  
*President, Chief Executive Officer and  
Principal Executive Officer*

### POWER OF ATTORNEY AND SIGNATURES

KNOW ALL BY THESE PRESENT, that each individual whose signature appears below hereby constitutes and appoints each of Douglas A. Treco, Ph.D. and David C. Lubner, as such person's true and lawful attorney-in-fact and agent with full power of substitution and resubstitution, for such person in such person's name, place and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this Registration Statement on Form S-8, and to file the same, with all exhibits thereto, and all documents in connection therewith, with the Securities and Exchange Commission granting unto each said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary to be done in and about the premises, as fully to all intents and purposes as such person might or could do in person, hereby ratifying and confirming all that any said attorney-in-fact and agent, or any substitute or substitutes of any of them, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed by the following person in the capacities and on the date indicated.

<u>Name</u>	<u>Title</u>	<u>Date</u>
<u>/s/ DOUGLAS A. TRECO</u> Douglas A. Treco, Ph.D.	<i>Director, President, Chief Executive Officer and Principal Executive Officer</i>	May 11, 2017
<u>/s/ DAVID C. LUBNER</u> David C. Lubner	<i>Executive Vice President, Chief Financial Officer and Principal Financial and Accounting Officer</i>	May 11, 2017
<u>/s/ PETER TUXEN BISGAARD</u> Peter Tuxen Bisgaard	<i>Director</i>	May 11, 2017
<u>/s/ ROBERT HEFT</u> Robert Heft, Ph.D.	<i>Director</i>	May 11, 2017
<u>/s/ JASON LETTMANN</u> Jason Lettmann	<i>Director</i>	May 11, 2017
<u>/s/ EDWARD T. MATHERS</u> Edward T. Mathers	<i>Director</i>	May 11, 2017
<u>/s/ TIMOTHY R. PEARSON</u> Timothy R. Pearson	<i>Director</i>	May 11, 2017
<u>/s/ RAJEEV SHAH</u> Rajeev Shah	<i>Director</i>	May 11, 2017

## EXHIBIT INDEX

Exhibit No.	Description
4.1	Third Amended and Restated Certificate of Incorporation of the Registrant, as currently in effect (incorporated by reference to Exhibit 3.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 333-213917) filed November 29, 2016)
4.2	Amended and Restated By-laws of the Registrant, as currently in effect (incorporated by reference to Exhibit 3.2 to the Registrant's Quarterly Report on Form 10-Q (File No. 333-213917) filed November 29, 2016)
4.3	Investors' Rights Agreement among the Registrant and certain of its stockholders, dated July 10, 2015 (incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-1 (File No. 333-213917) filed September 30, 2016)
5.1*	Opinion of Goodwin Procter LLP.
23.1*	Consent of Deloitte & Touche LLP, Independent Registered Public Accounting Firm.
23.2	Consent of Goodwin Procter LLP (included in Exhibit 5.1).
24.1	Power of Attorney (included on signature page).
99.1	2016 Stock Award and Incentive Plan and forms of award agreements thereunder (incorporated by reference to Exhibit 10.2 to the Registrant's Registration Statement on Form S-1/A (File No. 333-213917) filed October 13, 2016)
99.2	Employee Stock Purchase Plan (incorporated by reference to Exhibit 10.4 to the Registrant's Registration Statement on Form S-1/A (File No. 333-213917) filed October 13, 2016)

\* Filed herewith.

May 11, 2017

Ra Pharmaceuticals, Inc.  
87 Cambridge Park Drive  
Cambridge, Massachusetts 02140

Re: Securities Being Registered under Registration Statement on Form S-8

Ladies and Gentlemen:

We have acted as counsel to you in connection with your filing of a Registration Statement on Form S-8 (the "Registration Statement") pursuant to the Securities Act of 1933, as amended (the "Securities Act"), on or about the date hereof relating to an aggregate of 1,127,307 shares (the "Shares") of Common Stock, \$0.001 par value per share, of Ra Pharmaceuticals, Inc., a Delaware corporation (the "Company"), that may be issued pursuant to the Company's 2016 Stock Award and Incentive Plan and 2016 Employee Stock Purchase Plan (collectively, the "Plans").

We have reviewed such documents and made such examination of law as we have deemed appropriate to give the opinions set forth below. We have relied, without independent verification, on certificates of public officials and, as to matters of fact material to the opinion set forth below, on certificates of officers of the Company.

The opinion set forth below is limited to the Delaware General Corporation Law.

For purposes of the opinion set forth below, we have assumed that a sufficient number of authorized but unissued shares of the Company's Common Stock will be available for issuance when the Shares are issued.

Based on the foregoing, we are of the opinion that the Shares have been duly authorized and, upon issuance and delivery against payment therefor in accordance with the terms of the Plans, will be validly issued, fully paid and nonassessable.

We hereby consent to the inclusion of this opinion as Exhibit 5.1 to the Registration Statement. In giving our consent, we do not admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations thereunder.

Very truly yours,

/S/ GOODWIN PROCTER LLP

GOODWIN PROCTER LLP

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**CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM**

We consent to the incorporation by reference in this Registration Statement on Form S-8 of our report dated March 6, 2017, relating to the financial statements of Ra Pharmaceuticals, Inc. appearing in the Annual Report on Form 10-K of Ra Pharmaceuticals, Inc. for the year ended December 31, 2016.

/s/ Deloitte & Touche LLP

Boston, Massachusetts  
May 11, 2017

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