

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

OMB APPROVAL

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SCHEDULE 13D

Under the Securities Exchange Act of 1934

(Amendment No. ___)*

Ra Pharmaceuticals, Inc.
(Name of Issuer)

Common Stock, par value \$0.001 per share
(Title of Class of Securities)

74933V108
(CUSIP Number)

RA Capital Management, LLC
20 Park Plaza, Suite 1200
Boston, MA 02116
Telephone: 617.778.2512
Attn: Peter Kolchinsky
(Name, Address and Telephone Number of Person Authorized to
Receive Notices and Communications)

October 31, 2016
(Date of Event Which Requires Filing of this Statement)

If the filing person has previously filed a statement on Schedule 13G to report the acquisition that is the subject of this Schedule 13D, and is filing this schedule because of §§240.13d-1(e), 240.13d-1(f) or 240.13d-1(g), check the following box. []

Note: Schedules filed in paper format shall include a signed original and five copies of the schedule, including all exhibits. See Rule 13d-7 for other parties to whom copies are to be sent.

* The remainder of this cover page shall be filled out for a reporting person's initial filing on this form with respect to the subject class of securities, and for any subsequent amendment containing information which would alter disclosures provided in a prior cover page.

The information required on the remainder of this cover page shall not be deemed to be "filed" for the purpose of Section 18 of the Securities Exchange Act of 1934 ("Act") or otherwise subject to the liabilities of that section of the Act but shall be subject to all other provisions of the Act (however, see the Notes).

1	Names of Reporting Persons. RA Capital Management, LLC		
2	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input type="checkbox"/>		
3	SEC Use Only		
4	Source of Funds (See Instructions): AF		
5	Check if disclosure of legal proceedings is required pursuant to Items 2(d) or 2(e): <input type="checkbox"/>		
6	Citizenship or Place of Organization. Massachusetts		
	Number of Shares Beneficially Owned by Each Reporting Person With		
	7	Sole Voting Power	0 shares
	8	Shared Voting Power	1,351,808 shares
	9	Sole Dispositive Power	0 shares
	10	Shared Dispositive Power	1,351,808 shares
11	Aggregate Amount Beneficially Owned by Each Reporting Person 1,351,808 shares		
12	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions) <input type="checkbox"/>		
13	Percent of Class Represented by Amount in Row (11) 6.3%²		
14	Type of Reporting Person (See Instructions) IA, OO (Limited Liability Company)		

² The reporting person is the beneficial owner of 1,351,808 shares of the Issuer's Common Stock which constitute approximately 6.3% of the class outstanding. The percentage calculation assumes that there are currently 21,488,480 outstanding shares of Common Stock of the Issuer, based upon the closing of the Issuer's initial public offering, as reported in the Issuer's prospectus filed with the Securities and Exchange Commission ("SEC") on October 25, 2016.

1	Names of Reporting Persons. RA Capital Healthcare Fund, L.P.		
2	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input type="checkbox"/>		
3	SEC Use Only		
4	Source of Funds (See Instructions): WC		
5	Check if disclosure of legal proceedings is required pursuant to Items 2(d) or 2(e): <input type="checkbox"/>		
6	Citizenship or Place of Organization. Delaware		
	Number of Shares Beneficially Owned by Each Reporting Person With	7	Sole Voting Power 0 shares
		8	Shared Voting Power 1,111,950 shares
		9	Sole Dispositive Power 0 shares
		10	Shared Dispositive Power 1,111,950 shares
11	Aggregate Amount Beneficially Owned by Each Reporting Person 1,111,950 shares		
12	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions) <input type="checkbox"/>		
13	Percent of Class Represented by Amount in Row (11) 5.2%¹		
14	Type of Reporting Person (See Instructions) PN (Limited Partnership)		

¹ The reporting person is the beneficial owner of 1,111,950 shares of the Issuer's Common Stock which constitute approximately 5.2% of the class outstanding. The percentage calculation assumes that there are currently 21,488,480 outstanding shares of Common Stock of the Issuer, based upon the closing of the Issuer's initial public offering, as reported in the Issuer's prospectus filed with the Securities and Exchange Commission ("SEC") on October 25, 2016.

1	Names of Reporting Persons. Peter Kolchinsky		
2	Check the Appropriate Box if a Member of a Group (See Instructions) (a) <input type="checkbox"/> (b) <input type="checkbox"/>		
3	SEC Use Only		
4	Source of Funds (See Instructions): AF		
5	Check if disclosure of legal proceedings is required pursuant to Items 2(d) or 2(e): <input type="checkbox"/>		
6	Citizenship or Place of Organization. United States		
	Number of Shares Beneficially Owned by Each Reporting Person With		
	7	Sole Voting Power	0 shares
	8	Shared Voting Power	1,351,808 shares
	9	Sole Dispositive Power	0 shares
	10	Shared Dispositive Power	1,351,808 shares
11	Aggregate Amount Beneficially Owned by Each Reporting Person 1,351,808 shares		
12	Check if the Aggregate Amount in Row (11) Excludes Certain Shares (See Instructions) <input type="checkbox"/>		
13	Percent of Class Represented by Amount in Row (11) 6.3%²		
14	Type of Reporting Person (See Instructions) HC, IN		

² The reporting person is the beneficial owner of 1,351,808 shares of the Issuer's Common Stock which constitute approximately 6.3% of the class outstanding. The percentage calculation assumes that there are currently 21,488,480 outstanding shares of Common Stock of the Issuer, based upon the closing of the Issuer's initial public offering, as reported in the Issuer's prospectus filed with the Securities and Exchange Commission ("SEC") on October 25, 2016.

SCHEDULE 13D

Item 1. Security and Issuer

This Schedule 13D relates to common stock, par value \$0.001 per share (the "Common Stock"), of Ra Pharmaceuticals, Inc., a Delaware corporation (the "Issuer"). The address of the principal executive offices of the Issuer is: 87 Cambridge Park Drive, Cambridge, MA 02140.

Item 2. Identity and Background

(a) This Schedule 13D is being filed on behalf of (i) RA Capital Healthcare Fund, L.P. (the "Fund"), (ii) Peter Kolchinsky, and (iii) RA Capital Management, LLC ("RA Capital" and together with each of the foregoing, the "Reporting Persons").

Common Stock reported herein for the Fund represent shares beneficially owned and held of record by the Fund. Common Stock reported herein for RA Capital represent shares reported for the Fund as well as shares held in a separately managed account (the "Account"). RA Capital is the general partner of the Fund and serves as investment adviser for the Account. Peter Kolchinsky is the manager of RA Capital. As the investment adviser to the Fund and the Account, RA Capital may be deemed a beneficial owner, for purposes of Section 13(d) of the Securities Exchange Act of 1934 (the "Act"), of any securities of the Issuer owned by the Fund or the Account. As the manager of RA Capital, Mr. Kolchinsky may be deemed a beneficial owner, for purposes of Section 13(d) of the Act, of any securities of the Issuer beneficially owned by RA Capital. RA Capital is a registered investment adviser within the meaning of Rule 13d-1(b)(1)(ii)(E) and Rule 16a-1(a)(v), and Mr. Kolchinsky is a parent or control person of RA Capital within the meaning of Rule 13d-1(b)(1)(ii)(G) and Rule 16a-1(a)(1)(vii). RA Capital and Mr. Kolchinsky disclaim beneficial ownership of the securities reported in this Schedule 13D Statement (the "Statement") other than for the purpose of determining their obligations under Section 13(d) of the Act, and neither the filing of the Statement nor the filing of this Amendment shall not be deemed an admission that either RA Capital or Mr. Kolchinsky is or was the beneficial owner of such securities for any other purpose.

(b) The business address of each of the Reporting Persons is: 20 Park Plaza, Suite 1200, Boston, MA 02116.

(c) The Fund is a private investment vehicle. RA Capital provides investment management services to the Fund and the Account. The principal occupation of Mr. Kolchinsky is investment management.

(d) None of the Reporting Persons has, during the last five years, been convicted in a criminal proceeding (excluding traffic violations or similar misdemeanors).

(e) None of the Reporting Persons has, during the last five years, been a party to a civil proceeding of a judicial or administrative body of competent jurisdiction and as a result of such proceeding was or is subject to a judgment, decree or final order enjoining future violations of, or prohibiting or mandating activities subject to, federal or state securities laws or finding any violation with respect to such laws.

(f) See Item 6 of the cover pages.

Item 3. Source and Amount of Funds or Other Consideration

The Reporting Persons acquired the Common Stock reported herein in, in part, prior to the Issuer's initial public offering (the "IPO") in a private placement directly from the Issuer and, in part, upon consummation of the Issuer's IPO. On October 31, 2016, (i) 1,190,270 shares of Common Stock were acquired upon the automatic conversion of Series B Preferred shares, and (ii) the remaining 161,538 Common Stock shares were acquired for cash from the underwriters of the IPO. All purchases of the Series B Preferred shares and Common Stock were funded by working capital of the Fund and the Account.

Item 4. Purpose of Transaction

The Reporting Persons acquired the Common Stock reported herein for investment purposes and not with an intent, purpose or effect of changing control of the Issuer. Although the Reporting Persons currently have no plan or proposal to acquire any additional Common Stock or to dispose of any of the Common Stock reported herein, the Reporting Persons may acquire additional Common Stock from time to time or dispose of Common Stock they beneficially own, consistent with their investment purposes and in amounts to be determined by the Reporting Persons based upon a number of factors, including, without limitation, their ongoing assessment of the Issuer's business prospects, prevailing market conditions, the availability of other investment opportunities, and/or other considerations.

In addition, consistent with their investment purpose, the Reporting Persons may engage in communications with persons associated with the Issuer, including shareholders of the Issuer, officers of the Issuer and/or members of the board of directors of the Issuer, to discuss matters regarding the Issuer, including but not limited to its operations and strategic direction. Mr. Rajeev Shah, a manager of RA Capital, currently serves as a director of the Issuer and therefore will engage in regular discussions with the Issuer's board of directors and management as part of his duties as a director.

The Reporting Persons have no plans or proposals that relate to, or could result in, any of the matters referred to in paragraphs (a) through (j), inclusive, of the instructions to Item 4 of Schedule 13D.

The Reporting Persons may, however, change their purpose and formulate and implement plans or proposals with respect to the Issuer at any time and from time to time. Any such action may be made by the Reporting Persons alone or in conjunction with other shareholders, potential acquirers, financing sources and/or other third parties and could include one or more purposes, plans or proposals that relate to or would result in actions required to be reported herein in accordance with Item 4 of Schedule 13D.

Item 5. Interest in Securities of the Issuer

(a) and (b) See Items 7-11 of the cover pages and Item 2 above.

(c) The following table lists the Reporting Persons' transactions in Common Stock that were effected during the sixty day period prior to the filing of this Schedule 13D:

Transaction	Date	No. Shares	Price
Conversion	31-Oct-2016	979,593* and 210,677	(1)
Purchase	31-Oct-2016	132,357* and 29,181	\$13.00

(1) The Reporting Persons acquired beneficial ownership of the Issuer's Series B-1 Preferred shares in July 2015 and Series B-2 Preferred shares in June 2016, directly from the Issuer in a private placement. The Series B Preferred shares converted automatically (after a 1-for-7 reverse stock split effected by the Issuer on October 14, 2016) into Common Stock upon consummation of the Issuer's IPO on October 31, 2016.

Shares marked with an * were acquired by the Fund. The remaining shares were acquired for the Account.

(d) Not applicable.

(e) Not applicable.

Item 6. Contracts, Arrangements, Understandings or Relationships with Respect to Securities of the Issuer

The Reporting Persons have entered into a standard lock-up agreement with the Issuer and the underwriters of the IPO, prohibiting any sale of the Common Stock reported herein during the 180 days following the closing of the offering. The Reporting Persons may be released from lock-up prior to the expiration of the lock-up period at the sole discretion of the underwriters.

Item 7. Material to Be Filed as Exhibits

Exhibit 1 Joint Filing Agreement by and among the Reporting Persons.

SIGNATURE

After reasonable inquiry and to the best of my knowledge and belief, I certify that the information set forth in this statement is true, complete and correct.

Date: November 09, 2016

RA CAPITAL HEALTHCARE FUND, L.P.

By: RA Capital Management, LLC
General Partner

By: /s/ Peter Kolchinsky

Peter Kolchinsky
Manager

RA CAPITAL MANAGEMENT, LLC

By: /s/ Peter Kolchinsky

Peter Kolchinsky
Manager

PETER KOLCHINSKY

/s/ Peter Kolchinsky

Exhibit 1

JOINT FILING AGREEMENT

This Joint Filing Agreement, dated as of November 09, 2016, is by and among RA Capital Healthcare Fund, L.P., RA Capital Management, LLC, and Peter Kolchinsky (the foregoing are collectively referred to herein as the "Filers").

Each of the Filers may be required to file with the United States Securities and Exchange Commission a statement on Schedule 13G and/or 13D with respect to Common Stock of Ra Pharmaceuticals, Inc. beneficially owned by them from time to time.

Pursuant to and in accordance with Rule 13(d)(1)(k) promulgated under the Securities Exchange Act of 1934, as amended, the Filers hereby agree to file a single statement on Schedule 13G and/or 13D (and any amendments thereto) on behalf of each of such parties, and hereby further agree to file this Joint Filing Agreement as an exhibit to such statement, as required by such rule.

This Joint Filing Agreement may be terminated by any of the Filers upon one week's prior written notice or such lesser period of notice as the Filers may mutually agree.

Executed and delivered as of the date first above written.

RA CAPITAL HEALTHCARE FUND, L.P.

By: RA Capital Management, LLC
General Partner

By: /s/ Peter Kolchinsky

Peter Kolchinsky
Manager

RA CAPITAL MANAGEMENT, LLC

By: /s/ Peter Kolchinsky

Peter Kolchinsky
Manager

PETER KOLCHINSKY

/s/ Peter Kolchinsky
