
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

SCHEDULE 13D

Under the Securities Exchange Act of 1934

Parabilis Medicines, Inc.

(Name of Issuer)

Common Stock, par value \$0.0001 per share

(Title of Class of Securities)

(CUSIP Number)

Peter Kolchinsky
RA Capital Management, L.P., 200 Berkeley Street, 18th Floor
Boston, MA, 02116
617.778.2500

(Name, Address and Telephone Number of Person Authorized to Receive Notices and Communications)

06/11/2026

(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. ☐

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).

SCHEDULE 13D

CUSIP No.

Name of reporting person

1

RA Capital Management, L.P.

Check the appropriate box if a member of a Group (See Instructions)

2

☐ (a)

☐ (b)

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)
	☐
6	Citizenship or place of organization
	DELAWARE
	Sole Voting Power
7	0.00
Number of Shares Beneficially Owned by Each Reporting Person	Shared Voting Power
8	28,933,371.00
	Sole Dispositive Power
9	0.00
With:	Shared Dispositive Power
10	28,933,371.00
	Aggregate amount beneficially owned by each reporting person
11	28,933,371.00
12	Check if the aggregate amount in Row (11) excludes certain shares (See Instructions)
	☐
13	Percent of class represented by amount in Row (11)
	23.8 %
14	Type of Reporting Person (See Instructions)
	IA, PN

SCHEDULE 13D

CUSIP No.

1	Name of reporting person
	Peter Kolchinsky
	Check the appropriate box if a member of a Group (See Instructions)
2	☐ (a)
	☐ (b)
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)
	☐
6	Citizenship or place of organization
	UNITED STATES
Number of Shares Beneficially Owned by	Sole Voting Power
7	0.00
8	Shared Voting Power

Each Reporting Person With:	28,933,371.00
	Sole Dispositive Power
9	0.00
	Shared Dispositive Power
10	28,933,371.00
	Aggregate amount beneficially owned by each reporting person
11	28,933,371.00
	Check if the aggregate amount in Row (11) excludes certain shares (See Instructions)
12	☐
	Percent of class represented by amount in Row (11)
13	23.8 %
	Type of Reporting Person (See Instructions)
14	HC, IN

SCHEDULE 13D

CUSIP No.

1	Name of reporting person
	Rajeev Shah
	Check the appropriate box if a member of a Group (See Instructions)
2	☐ (a)
	☐ (b)
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)
	☐
6	Citizenship or place of organization
	UNITED STATES
	Sole Voting Power
7	0.00
	Shared Voting Power
8	28,933,371.00
	Sole Dispositive Power
9	0.00
	Shared Dispositive Power
10	28,933,371.00
	Aggregate amount beneficially owned by each reporting person
11	28,933,371.00
12	Check if the aggregate amount in Row (11) excludes certain shares (See Instructions)

	☐	Percent of class represented by amount in Row (11)
13		23.8 %
		Type of Reporting Person (See Instructions)
14		HC, IN

SCHEDULE 13D

CUSIP No.

	Name of reporting person	
1	RA Capital Healthcare Fund, L.P.	
	Check the appropriate box if a member of a Group (See Instructions)	
2	☐ (a)	
	☐ (b)	
3	SEC use only	
	Source of funds (See Instructions)	
4	WC	
	Check if disclosure of legal proceedings is required pursuant to Items 2(d) or 2(e)	
5	☐	
	Citizenship or place of organization	
6	DELAWARE	
	Sole Voting Power	
7	0.00	
	Shared Voting Power	
8	26,285,093.00	
	Sole Dispositive Power	
9	0.00	
	Shared Dispositive Power	
10	26,285,093.00	
	Aggregate amount beneficially owned by each reporting person	
11	26,285,093.00	
	Check if the aggregate amount in Row (11) excludes certain shares (See Instructions)	
12	☐	
	Percent of class represented by amount in Row (11)	
13	21.6 %	
	Type of Reporting Person (See Instructions)	
14	PN	

SCHEDULE 13D

Item 1. Security and Issuer
Title of Class of Securities:

(a) Common Stock, par value \$0.0001 per share

Name of Issuer:

(b) Parabilis Medicines, Inc.

Address of Issuer's Principal Executive Offices:

(c) 30 Acorn Park Drive, Cambridge, MASSACHUSETTS , 02140.

Item 2. Identity and Background

This Schedule 13D is being filed on behalf of RA Capital Management, L.P. ("RA Capital"), Peter Kolchinsky, Rajeev Shah and RA Capital Healthcare Fund, L.P. (the "Fund"). RA Capital, Dr. Kolchinsky, Mr. Shah and the Fund are collectively referred to herein as the "Reporting Persons." The agreement among the Reporting Persons to file this Schedule 13D jointly in accordance with Rule 13d-1(k) of the Securities Exchange Act of 1934, as amended, (the "Act") is attached hereto as Exhibit 99.1. The Reporting Persons' ownership of the Issuer's securities includes (i) 26,285,093 shares of voting common stock held directly by the Fund; and (ii) 2,648,278 shares of voting common stock held directly by RA Capital Nexus Fund III, L.P. (the "Nexus Fund III"). RA Capital Healthcare Fund GP, LLC is the general partner of the Fund and RA Capital Nexus Fund III GP, LLC is the general partner of the Nexus Fund III. The general partner of RA Capital is RA Capital Management GP, LLC, of which Dr. Kolchinsky and Mr. Shah are the controlling persons. RA Capital serves as investment adviser for each of the Fund and the Nexus Fund III and may be deemed a beneficial owner, for purposes of Section 13(d) of the Act, of any securities of the Issuer held by the Fund or the Nexus Fund III. Each of the Fund and the Nexus Fund III has delegated to RA Capital the sole power to vote and the sole power to dispose of all securities held in its portfolio, including the shares of the Issuer's voting common stock reported herein. Because each of the Fund and the Nexus Fund III has divested itself of voting and investment power over the reported securities it holds and may not revoke that delegation on less than 61 days' notice, each of the Fund and the Nexus Fund III disclaims beneficial ownership of the securities it holds for purposes of Section 13(d) of the Act and therefore disclaims any obligation to report ownership of the reported securities under Section 13(d) of the Act. As managers of RA Capital, Dr. Kolchinsky and Mr. Shah may be deemed beneficial owners, for purposes of Section 13(d) of the Act, of any securities of the Issuer beneficially owned by RA Capital. RA Capital, Dr. Kolchinsky, and Mr. Shah disclaim beneficial ownership of the securities reported in this Schedule 13D other than for the purpose of determining their obligations under Section 13(d) of the Act, and the filing of this Schedule 13D shall not be deemed an admission that either RA Capital, Dr. Kolchinsky, or Mr. Shah is the beneficial owner of such securities for any other purpose.

(b) The address of the principal business office of each of the Reporting Persons is 200 Berkeley Street, 18th Floor, Boston, MA 02116.

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

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

(e) During the last five years, none of the Reporting Persons has 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 of 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

Prior to the Issuer's initial public offering (the "IPO"), (i) the Fund purchased 642,250 shares of Series E preferred stock of the Issuer and 9,445,363 shares of Series F preferred stock of the Issuer; and (ii) the Nexus Fund III purchased 160,562 shares of Series E preferred stock of the Issuer and 1,666,829 shares of Series F preferred stock of the Issuer. The aggregate purchase price of the foregoing securities was \$73,499,989. In connection with the closing of the IPO on June 11, 2026, the Series E preferred stock and Series F preferred stock automatically converted into shares of voting common stock on a 1-to-0.6524 and 1-to-0.6498 basis, respectively. The Fund and the Nexus Fund III also purchased 19,728,353 and 1,460,397 shares of voting common stock, respectively, from the underwriters of the IPO at the IPO price of \$20.00 per share, for an aggregate purchase price of \$423,775,000. All purchases of the securities described herein were for cash and were funded by working capital of the Fund and the Nexus Fund III, as applicable.

Item 4. Purpose of Transaction

The Reporting Persons acquired the voting common stock reported herein for investment purposes and not with an intent, purpose or effect of changing control of the Issuer. The Reporting Persons may, from time to time, acquire additional equity securities or debt securities of the Issuer, which debt securities may be convertible or non-convertible, secured or unsecured, and could involve the monetization of potential revenue streams deriving from development-stage or commercial programs of the Issuer, or dispose of Issuer securities they beneficially own, on the open market or in private transactions or otherwise (including by means of 10b5-1 programs), consistent with their investment purposes and in amounts, on such terms and at such times as 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, the availability of Issuer securities at prices that would make the purchase or sale of such securities desirable, 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 stockholders of the Issuer, officers of the Issuer, members of the board of directors of the Issuer, and/or other third parties, to discuss matters regarding the Issuer, including but not limited to its operations, strategic direction, governance or capitalization, and potential business combinations or dispositions involving the Issuer or certain of its businesses. Dr. Jake Simson, a Partner 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. Neither Dr. Simson (other than in his capacity as a director) nor the Reporting Persons have any present 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. Depending on various factors including, without limitation, the Issuer's financial position, results and strategic direction, actions taken by the Issuer's management and Board, other investment opportunities available to RA Capital, the price levels of the Issuer securities, conditions in the securities markets and general economic and industry conditions, the Reporting Persons may 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 stockholders, 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

- Rows 11 and 13 of each Reporting Person's cover page to this Schedule 13D set forth the aggregate number of shares of voting common stock and percentage of outstanding voting common stock beneficially owned by such Reporting Person and are incorporated by reference. The percentage set forth in each row 13 is based upon 121,589,570 shares of voting common stock outstanding as of June 11, 2026, as reported in the Issuer's final prospectus dated June 9, 2026 filed with the Securities and Exchange Commission (the "SEC") on June 10, 2026.
- (a)
- (b) Rows 7 through 10 of each Reporting Person's cover page to this Schedule 13D set forth the number of shares of voting common stock as to which such Reporting Person has the sole or shared power to vote or direct the vote and sole or shared power to dispose or to direct the disposition and are incorporated by reference.
- (c) Except as set forth herein, none of the Reporting Persons has effected any transactions with respect to the securities of the Issuer during the past sixty days.
- (d) No person (other than the Reporting Persons) is known to have the right to receive or the power to direct the receipt of dividends from, or the proceeds from the sale of, the shares of voting common stock subject to this 13D.
- (e) Not applicable.

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

Lock-up Agreements The holders of substantially all of the Issuer's pre-IPO capital stock, including the Fund and the Nexus Fund III, and each of the Issuer's directors, entered into lock-up agreements (the "Lock-Up Agreements") with the representatives of the underwriters of the Issuer's IPO. Pursuant to the Lock-Up Agreements, neither the Fund nor the Nexus Fund III is permitted, with limited exceptions, for a period of 180 days from June 9, 2026, to dispose of or hedge any of the Issuer's securities, except with the prior written consent of Leerink Partners LLC and BofA Securities, Inc. The description of the Lock-Up Agreements contained in this Item 6 is qualified in its entirety by reference to the full text of the form of Lock-up Agreement filed as Exhibit 99.2 to this Schedule 13D and incorporated by reference herein. **Sixth Amended and Restated Investors' Rights Agreement** On January 6, 2026, certain investors of the Issuer, including the Fund and the Nexus Fund III, entered into the sixth amended and restated investors' right agreement (the "Investors' Rights Agreement") with the Issuer, pursuant to which the Issuer agreed to register for resale certain shares of common stock and other equity securities of the Issuer that are held by the investors party thereto (the "Registrable Securities"). Pursuant to the Investors' Rights Agreement, at any time beginning 12 months after June 11, 2026, holders of at least 25% of the outstanding Registrable Securities may request the Issuer to file a registration statement to sell Registrable Securities with an anticipated aggregate offering amount of at least \$10 million net of certain expenses related to the offering. The investors may request a maximum of two registration statements. In addition, holders of at least 25% of the outstanding Registrable Securities may request the Issuer to file a registration statement on Form S-3, if eligible, to sell Registrable Securities with an anticipated aggregate offering amount of at least \$5 million net of certain expenses related to the offering. The investors may request a maximum of two registration statements on Form S-3 in a 12-month period. The Issuer will be responsible for certain expenses relating to such registrations and indemnify the stockholders against certain liabilities. The investors are also entitled to customary "piggyback" registration rights, subject to certain requirements and conditions. The registration rights granted under the Investors' Rights Agreement will terminate upon the earlier of (i) the closing of a Deemed Liquidation Event, as such term is defined in the Issuer's Certificate of Incorporation; (ii) as to a given holder of registration rights, when such holder of registration rights holds less than 1% of the Issuer's outstanding securities and such holder can sell all of such holder's registrable securities without limitation in a three-month period pursuant to Rule 144 promulgated under the Securities Act of 1933, as amended, or (iii) the fifth anniversary of the IPO. The description of the Investors' Rights Agreement contained in this Item 6 is qualified in its entirety by reference to the full text of the Sixth Amended and Restated Investors' Rights Agreement filed as Exhibit 99.3 to this Schedule 13D and incorporated by reference herein. **Equity Awards** Dr. Jake Simson, a Partner of RA Capital, is a member of the Board of Directors of the Issuer. From time to time, Dr. Simson may receive stock options or other awards of equity-based compensation pursuant to the Issuer's compensation arrangements for non-employee

directors. Pursuant to an agreement with RA Capital, Dr. Simson is obligated to transfer any securities issued under any such stock options or other awards, or the economic benefit thereof, to RA Capital.

Item 7. Material to be Filed as Exhibits.

Exhibit 99.1 Joint Filing Agreement Exhibit 99.2 Form of Lock-up Agreement (incorporated by reference to Exhibit B to the Form of Underwriting Agreement filed as Exhibit 1.1 to the Issuer's Registration Statement on Form S-1, as amended (Registration No. 333-296032), filed with the SEC on June 4, 2026). Exhibit 99.3 Sixth Amended and Restated Investors' Rights Agreement (incorporated by reference to Exhibit 4.2 to the Issuer's Registration Statement on Form S-1 (Registration No. 333-296032), filed with the SEC on April 2, 2026).

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.

RA Capital Management, L.P.

Signature: /s/ Peter Kolchinsky

Name/Title: By Peter Kolchinsky, Authorized Signatory

Date: 06/18/2026

Peter Kolchinsky

Signature: /s/ Peter Kolchinsky

Name/Title: Peter Kolchinsky

Date: 06/18/2026

Rajeev Shah

Signature: /s/ Rajeev Shah

Name/Title: Rajeev Shah

Date: 06/18/2026

RA Capital Healthcare Fund, L.P.

Signature: /s/ Peter Kolchinsky

Name/Title: By RA Capital Healthcare Fund GP, LLC, its
General Partner, By Peter Kolchinsky, Manager

Date: 06/18/2026

JOINT FILING AGREEMENT

This Joint Filing Agreement, dated as of June 18, 2026, is by and among RA Capital Management, L.P., Peter Kolchinsky, Rajeev Shah and RA Capital Healthcare Fund, L.P. (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 the common stock, par value \$0.0001 per share of Parabilis Medicines, 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 MANAGEMENT, L.P.

By: /s/ Peter Kolchinsky
Name: Peter Kolchinsky
Title: Authorized Signatory

PETER KOLCHINSKY

/s/ Peter Kolchinsky

RAJEEV SHAH

/s/ Rajeev Shah

RA CAPITAL HEALTHCARE FUND, L.P.

By: RA Capital Healthcare Fund GP, LLC
Its: General Partner

By: /s/ Peter Kolchinsky
Name: Peter Kolchinsky
Title: Manager