SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

SCHEDULE 13D

Under the Securities Exchange Act of 1934

(Amendment No. 5)*

PEPGEN 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)

11/13/2026

(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.

1	Name of reporting person RA Capital Management, L.P.
2	Check the appropriate box if a member of a Group (See Instructions)

☐ (a)
☐ (b)

3 SEC use only

Source of funds (See Instructions)

4 AF

Check if disclosure of legal proceedings is required pursuant to Items 2(d) or 2(e)

5 ☐

Citizenship or place of organization

6 DELAWARE

Number of Shares Beneficially Owned by Each Reporting Person With:	7	Sole Voting Power 0.00
	8	Shared Voting Power 28,742,212.00
	9	Sole Dispositive Power 0.00
	10	Shared Dispositive Power 28,742,212.00

Aggregate amount beneficially owned by each reporting person

11 28,742,212.00

Check if the aggregate amount in Row (11) excludes certain shares (See Instructions)

12 ☐

Percent of class represented by amount in Row (11)

13 30.5 %

Type of Reporting Person (See Instructions)

14 IA, PN

SCHEDULE 13D

CUSIP No.

Name of reporting person

1 Peter Kolchinsky

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 AF

Check if disclosure of legal proceedings is required pursuant to Items 2(d) or 2(e)

5 ☐

Citizenship or place of organization

6 UNITED STATES

Number of	7	Sole Voting Power

Shares Beneficially Owned by Each Reporting Person With:		0.00
	8	Shared Voting Power 28,742,212.00
	9	Sole Dispositive Power 0.00
	10	Shared Dispositive Power 28,742,212.00
11		Aggregate amount beneficially owned by each reporting person 28,742,212.00
12		Check if the aggregate amount in Row (11) excludes certain shares (See Instructions) ☐
13		Percent of class represented by amount in Row (11) 30.5 %
14		Type of Reporting Person (See Instructions) HC, IN

SCHEDULE 13D

CUSIP No.

1		Name of reporting person Rajeev Shah
2		Check the appropriate box if a member of a Group (See Instructions) ☐ (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 Each Reporting Person With:	7	Sole Voting Power 0.00
	8	Shared Voting Power 28,742,212.00
	9	Sole Dispositive Power 0.00
	10	Shared Dispositive Power 28,742,212.00
11		Aggregate amount beneficially owned by each reporting person

28,742,212.00

Check if the aggregate amount in Row (11) excludes certain shares (See Instructions)

12

☐

Percent of class represented by amount in Row (11)

13

30.5 %

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

Number of Shares Beneficially Owned by Each Reporting Person With:		
	7	Sole Voting Power 0.00
	8	Shared Voting Power 27,179,273.00
	9	Sole Dispositive Power 0.00
	10	Shared Dispositive Power 27,179,273.00

Aggregate amount beneficially owned by each reporting person

11

27,179,273.00

Check if the aggregate amount in Row (11) excludes certain shares (See Instructions)

12

☐

Percent of class represented by amount in Row (11)

13

28.8 %

Type of Reporting Person (See Instructions)

14

PN

SCHEDULE 13D

Item 1. Security and Issuer

(a) Title of Class of Securities:

Common stock, par value $0.0001 per share

(b) Name of Issuer:

PEPGEN INC.

(c) Address of Issuer's Principal Executive Offices:

321 Harrison Avenue, 8th Floor, Boston, MASSACHUSETTS , 02118.

Item 1 Comment: This Amendment No. 5 (this "Amendment No. 5" or this "Schedule 13D/A") amends and supplements the statement on Schedule 13D originally filed with the Securities and Exchange Commission (the "SEC") on May 20, 2022 and amended on June 23, 2022, February 13, 2024, March 11, 2024 and September 30, 2025 (as amended, the "Statement") by the Reporting Persons. Unless otherwise defined herein, capitalized terms used in this Amendment No. 5 shall have the meanings ascribed to them in the Statement. Unless amended or supplemented below, the information in the Statement remains unchanged.

Item 2. Identity and Background

(a) This Schedule 13D/A 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/A jointly in accordance with Rule 13d-1(k) of the Act is filed as Exhibit 99.1. The Reporting Persons' beneficial ownership of the Issuer's common stock consists of (i) 27,179,273 shares of common stock directly held by the Fund; (ii) 1,302,600 shares of common stock directly held by the RA Capital Nexus Fund II, L.P. (the "Nexus Fund II"); (iii) 207,672 shares of common stock directly held by a separately managed account (the "Account"); and (iv) a total of 52,667 shares of common stock underlying vested stock options (right to buy) held by Dr. Joshua Resnick for the benefit of RA Capital. RA Capital Healthcare Fund GP, LLC is the general partner of the Fund and RA Capital Nexus Fund II GP, LLC is the general partner of the Nexus Fund II. 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 the Fund, the Nexus Fund II, and the Account 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, the Nexus Fund II or the Account. The Fund and the Nexus Fund II have delegated to RA Capital the sole power to vote and the sole power to dispose of all securities held in the Fund and the Nexus Fund II, and each of these funds has divested themselves of voting and investment power over the reported securities they hold and may not revoke that delegation on less than 61 days' notice. The Fund and the Nexus Fund II disclaim beneficial ownership of the securities they hold for purposes of Section 13(d) of the Act and therefore disclaim 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 Statement other than for the purpose of determining their obligations under Section 13(d) of the Act, and the filing of the Statement 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, the Nexus Fund II and the Account. 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

Item 3 of the Statement is hereby amended and supplemented as follows: On November 13, 2026, the Fund purchased 8,625,000 shares of common stock at a price of $5.00 per share from the underwriters of the Issuer's public offering (the "2026 Public Offering"). The aggregate purchase price for all securities acquired by the Fund in the 2026 Public Offering was $43.125 million, which was funded by the working capital of the Fund.

Item 5. Interest in Securities of the Issuer

(a) Rows 11 and 13 of each Reporting Person's cover page to this Schedule 13D/A set forth the aggregate number of shares of common stock and percentage of the shares of common stock beneficially owned by such Reporting Person and are incorporated by reference. The percentage set forth in each row 13 is based upon the sum of (i) 69,261,282

shares of common stock outstanding as of November 4, 2026, as disclosed in the Issuer's Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission (the "SEC") on November 10, 2026; and (ii) 25,000,000 shares of common stock issued in the 2026 Public Offering, and giving effect to stock options, to the extent exercisable within 60 days hereof, as referenced herein.

(b) Rows 7 through 10 of each Reporting Person's cover page to this Schedule 13D/A set forth the number of shares of 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 in Item 3, 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 securities subject to this Schedule 13D/A.

(e) Not applicable.

Item 7. Material to be Filed as Exhibits.

Exhibit 99.1 Joint Filing Agreement (incorporated by reference to Exhibit 1 to the Reporting Persons' amendment to the Statement filed with the SEC on March 11, 2024).

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: 11/17/2026

Peter Kolchinsky

Signature: /s/ Peter Kolchinsky
Name/Title: Peter Kolchinsky
Date: 11/17/2026

Rajeev Shah

Signature: /s/ Rajeev Shah
Name/Title: Rajeev Shah
Date: 11/17/2026

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: 11/17/2026