
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

SCHEDULE 13D

UNDER THE SECURITIES EXCHANGE ACT OF 1934
(Amendment No. 1)*

AXCELLA HEALTH INC.

(Name of Issuer)

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

05454B105
(CUSIP Number)

Noubar B. Afeyan, Ph.D.
Flagship Pioneering
55 Cambridge Parkway, Suite 800E
Cambridge, MA 02142
(617) 868-1888

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

May 18, 2020
(Date of Event Which Requires Filing of Statement on Schedule 13D)

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), checking the following box.

* 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)	Name of Reporting Persons: Flagship VentureLabs IV, LLC	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): WC	
(5)	Check Box 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
	(8)	Shared Voting Power 2,035,830
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 2,035,830
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 2,035,830	
(12)	Check Box 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): 5.7%	
(14)	Type of Reporting Person (See Instructions): OO	

(1)	Name of Reporting Persons: Flagship Ventures Fund IV, L.P.	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): WC	
(5)	Check Box 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
	(8)	Shared Voting Power 6,844,610
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 6,844,610
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 6,844,610	
(12)	Check Box 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): 19.1%	
(14)	Type of Reporting Person (See Instructions): PN	

(1)	Name of Reporting Persons: Flagship Ventures Fund IV-Rx, L.P.	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): WC	
(5)	Check Box 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
	(8)	Shared Voting Power 1,056,752
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 1,056,752
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 1,056,752	
(12)	Check Box 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): 2.9%	
(14)	Type of Reporting Person (See Instructions): PN	

(1)	Name of Reporting Persons: Flagship Ventures Fund IV General Partner LLC	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): AF	
(5)	Check Box 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
	(8)	Shared Voting Power 7,901,362
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 7,901,362
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 7,901,362	
(12)	Check Box 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): 22.0%	
(14)	Type of Reporting Person (See Instructions): OO	

(1)	Name of Reporting Persons: Flagship Ventures Fund 2007, L.P.	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): WC	
(5)	Check Box 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
	(8)	Shared Voting Power 1,761,029
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 1,761,029
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 1,761,029	
(12)	Check Box 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): 4.9%	
(14)	Type of Reporting Person (See Instructions): PN	

(1)	Name of Reporting Persons: Flagship Ventures 2007 General Partner LLC	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): AF	
(5)	Check Box 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
	(8)	Shared Voting Power 1,761,029
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 1,761,029
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 1,761,029	
(12)	Check Box 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): 4.9%	
(14)	Type of Reporting Person (See Instructions): OO	

(1)	Name of Reporting Persons: Flagship Ventures Opportunities Fund I, L.P.	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): WC	
(5)	Check Box 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
	(8)	Shared Voting Power 2,886,023
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 2,886,023
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 2,886,023	
(12)	Check Box 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): 8.1%	
(14)	Type of Reporting Person (See Instructions): PN	

(1)	Name of Reporting Persons: Flagship Ventures Opportunities Fund I General Partner LLC	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): AF	
(5)	Check Box 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
	(8)	Shared Voting Power 2,886,023
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 2,886,023
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 2,886,023	
(12)	Check Box 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): 8.1%	
(14)	Type of Reporting Person (See Instructions): OO	

(1)	Name of Reporting Persons: Noubar B. Afeyan, Ph.D.	
(2)	Check the Appropriate Box if a Member of a Group (See Instructions): (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/>	
(3)	SEC Use Only:	
(4)	Source of Funds (See Instructions): AF	
(5)	Check Box 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 State of America	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH:	(7)	Sole Voting Power 0
	(8)	Shared Voting Power 12,548,414
	(9)	Sole Dispositive Power 0
	(10)	Shared Dispositive Power 12,548,414
(11)	Aggregate Amount Beneficially Owned by Each Reporting Person: 12,548,414	
(12)	Check Box 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): 35.0%	
(14)	Type of Reporting Person (See Instructions): IN	

ITEM 1. SECURITY AND ISSUER

This Amendment No. 1 (this “Amendment”) amends and supplements the Schedule 13D (the “Schedule 13D”) filed by the Reporting Persons (as defined below) on May 23, 2019 with respect to the common stock, \$0.001 par value per share (“Common Stock”), of Axcella Health Inc. (the “Issuer”). Except as specifically provided herein, this Amendment does not modify any of the information previously reported in the Schedule 13D.

ITEM 2. IDENTITY AND BACKGROUND

Item 2 of the Schedule 13D is hereby amended and restated as follows:

This Schedule 13D is being filed by the following persons (each a “Reporting Person”):

- i. Flagship VentureLabs IV, LLC, a Delaware limited liability company (“VentureLabs IV”). The manager of VentureLabs IV is Flagship Ventures Fund IV, L.P., a Delaware limited partnership (“Flagship Fund IV”).
- ii. Flagship Fund IV. The general partner of Flagship Fund IV is Flagship Ventures Fund IV General Partner LLC, a Delaware limited liability company (“Flagship Fund IV GP”).
- iii. Flagship Ventures Fund IV-Rx, L.P., a Delaware limited partnership (“Flagship Fund IV-Rx” and together with VentureLabs IV and Flagship Fund IV, the “Flagship IV Funds”). The general partner of Flagship Fund IV-Rx is Flagship Fund IV GP.
- iv. Flagship Fund IV GP. Noubar B. Afeyan, Ph.D. (“Dr. Afeyan”) is the sole manager of Flagship Fund IV GP.
- v. Flagship Ventures Fund 2007, L.P., a Delaware limited partnership (“Flagship Fund 2007”). The general partner of Flagship Fund 2007 is Flagship Ventures 2007 General Partner LLC, a Delaware limited liability company (“Flagship Fund 2007 GP”).
- vi. Flagship Fund 2007 GP. Dr. Afeyan is the sole manager of Flagship Fund 2007 GP.
- vii. Flagship Ventures Opportunities Fund I, L.P., a Delaware limited partnership (“Flagship Opportunities I” and together with the Flagship IV Funds and Flagship Fund 2007, the “Flagship Funds”). The general partner of Flagship Opportunities I is Flagship Ventures Opportunities Fund I General Partner LLC, a Delaware limited liability company (“Flagship Opportunities GP”).
- viii. Flagship Opportunities GP. Dr. Afeyan is the sole manager of Flagship Opportunities GP.
- ix. Dr. Afeyan, a citizen of the United States of America.

Effective May 11, 2020, Edwin M. Kania, Jr. retired from Flagship Pioneering, Inc. and as manager of Flagship Fund IV GP and Flagship Fund 2007 GP.

The principal business of each Reporting Person is the venture capital investment business. The principal business address of each Reporting Person is 55 Cambridge Parkway, Suite 800E, Cambridge, Massachusetts 02142.

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

During the last five years, none of the Reporting Persons has been party to a civil proceeding of a judicial or administrative body of competent jurisdiction and as a result of such proceeding were or are 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.

ITEM 3. SOURCE AND AMOUNT OF FUNDS OR OTHER CONSIDERATION

Item 3 is hereby amended to include the following:

The information set forth in Item 4 below is incorporated by reference in its entirety into this Item 3.

ITEM 4. PURPOSE OF TRANSACTION

Item 4 is hereby amended and restated as follows:

The Reporting Persons acquired the shares of Common Stock set forth in Item 5 and hold their shares of Common Stock for investment purposes. Subject to a number of factors, including market conditions and their general investment and trading policies, the Reporting Persons may, in the ordinary course of their business, dispose of the shares of Common Stock that they beneficially own. These dispositions may occur in open market transactions, privately negotiated transactions or through other methods. Additionally, the Flagship Funds may distribute the shares of Common Stock that they directly hold to their respective limited partners.

David R. Epstein, who is an Executive Partner at Flagship Pioneering Inc., an affiliate of the Reporting Persons, is Chairman of the board of directors of the Issuer.

The Reporting Persons, either directly or indirectly through Mr. Epstein, may engage in discussions from time to time with the Issuer's board of directors, the Issuer's management or the Issuer's other stockholders. These discussions may be with respect to (i) acquiring or disposing shares of Common Stock or other securities of the Issuer (collectively, the "Securities"); (ii) maintaining or changing the Issuer's business, operations, governance, management, strategy or capitalization; or (iii) implementing transactions that may relate to or may result in any matter set forth in paragraphs (a) through (j) of Item 4 of Schedule 13D. Additionally, the Reporting Persons may acquire additional Securities through open market transactions, privately negotiated transactions or other methods.

The information set forth in Item 6 below is incorporated by reference in its entirety into this Item 4.

On May 18, 2020, Flagship Fund IV, Flagship Fund IV-Rx and Flagship Opportunities I purchased an additional 1,520,000 shares, 380,000 shares and 1,900,000 shares, respectively, of the Issuer's Common Stock in an underwritten public offering (the "May 2020 Public Offering") at the price per share of \$4.75.

ITEM 5. INTEREST IN SECURITIES OF THE ISSUER

Item 5(a)-(c) is hereby amended and restated as follows:

(a)-(b) The information set forth in rows 7 through 13 of the cover pages to this Schedule 13D is incorporated by reference. The percentage set forth in row 13 is based on 35,838,816 outstanding shares of Common Stock immediately following the Issuer's public offering, as reported by the Issuer in the final prospectus relating to the May 2020 Public Offering filed with the Securities and Exchange Commission pursuant to Rule 424(b) under the Securities Act on May 14, 2020 (after full exercise of the underwriters' option to purchase additional shares).

VentureLabs IV, Flagship Fund IV and Flagship Fund IV-Rx directly hold 2,035,830 shares, 4,808,780 shares and 1,056,752 shares of Common Stock, respectively. Flagship Fund IV, as the manager of VentureLabs IV, may be deemed to beneficially own the shares directly held by VentureLabs IV. Flagship Fund IV GP, as the general partner of the Flagship Fund IV Funds, may be deemed to beneficially own the shares directly held by the Flagship Fund IV Funds.

Flagship Fund 2007 directly holds 1,761,029 shares of Common Stock. Flagship Fund 2007 GP, as the general partner of Flagship Fund 2007, may be deemed to beneficially own the shares directly held by Flagship Fund 2007.

Flagship Opportunities I directly holds 2,886,023 shares of Common Stock. Flagship Opportunities GP, as the general partner of Flagship Opportunities I, may be deemed to beneficially own the shares directly held by Flagship Opportunities I.

Dr. Afeyan, as the sole manager of Flagship Fund IV GP, Flagship Fund 2007 GP and Flagship Opportunities GP, may be deemed to beneficially own the shares directly held by the Flagship IV Funds, Flagship Fund 2007 and Flagship Opportunities I.

(c) On May 18, 2019, Flagship Fund IV, Flagship Fund IV-Rx and Flagship Opportunities I purchased an additional 1,520,000 shares, 380,000 shares and 1,900,000 shares, respectively, of the Issuer's Common Stock in connection with the Issuer's May 2020 Public Offering. The purchase price was \$4.75 per share.

ITEM 7. MATERIAL TO BE FILED AS EXHIBITS

Exhibit 1 Joint Filing Agreement (filed herewith).

SIGNATURE

After reasonable inquiry and to the best of its knowledge and belief, the undersigned certifies that the information set forth in this Statement is true, complete and correct.

Dated: May 20, 2020

FLAGSHIP VENTURELABS IV, LLC

By: Flagship Ventures Fund IV, L.P.

By: Flagship Ventures Fund IV General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND IV, L.P.

By: Flagship Ventures Fund IV General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND IV-Rx, L.P.

By: Flagship Ventures Fund IV General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND IV GENERAL PARTNER
LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND 2007, L.P.

By: Flagship Ventures 2007 General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES 2007 GENERAL PARTNER LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES OPPORTUNITIES FUND I, L.P.

By: Flagship Ventures Opportunities Fund I General
Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.
Name: Noubar B. Afeyan, Ph.D.
Title: Manager

FLAGSHIP VENTURES OPPORTUNITIES FUND I
GENERAL PARTNER LLC

By: /s/ Noubar B. Afeyan, Ph.D.
Name: Noubar B. Afeyan, Ph.D.
Title: Manager

/s/ Noubar B. Afeyan, Ph.D.
NOUBAR B. AFEYAN, PH.D.

CUSIP No. 05454B105

JOINT FILING AGREEMENT

The persons below hereby agree that the Schedule 13D to which this agreement is attached as an exhibit, as well as all future amendments to such Schedule 13D, shall be filed jointly on behalf of each of them. This agreement is intended to satisfy the requirements of Rule 13d-1(k)(1)(iii) under the Securities Exchange Act of 1934.

Dated: May 20, 2020

FLAGSHIP VENTURELABS IV, LLC

By: Flagship Ventures Fund IV, L.P.

By: Flagship Ventures Fund IV General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND IV, L.P.

By: Flagship Ventures Fund IV General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND IV-Rx, L.P.

By: Flagship Ventures Fund IV General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND IV GENERAL PARTNER
LLCBy: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES FUND 2007, L.P.

By: Flagship Ventures 2007 General Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES 2007 GENERAL PARTNER LLC

By: /s/ Noubar B. Afeyan, Ph.D.

Name: Noubar B. Afeyan, Ph.D.

Title: Manager

FLAGSHIP VENTURES OPPORTUNITIES FUND I, L.P.

By: Flagship Ventures Opportunities Fund I General
Partner LLC

By: /s/ Noubar B. Afeyan, Ph.D.
Name: Noubar B. Afeyan, Ph.D.
Title: Manager

FLAGSHIP VENTURES OPPORTUNITIES FUND I
GENERAL PARTNER LLC

By: /s/ Noubar B. Afeyan, Ph.D.
Name: Noubar B. Afeyan, Ph.D.
Title: Manager

/s/ Noubar B. Afeyan, Ph.D.
NOUBAR B. AFEYAN, PH.D.