

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

SCHEDULE 13G
Under the Securities Exchange Act of 1934

(Amendment No. 2)*

Arrowhead Research Corporation

(Name of Issuer)

Common Stock, \$0.001 par value

(Title of Class of Securities)

042797209

(CUSIP Number)

December 31, 2013

(Date of Event Which Requires Filing of this Statement)

Check the appropriate box to designate the rule pursuant to which this Schedule is filed:

- Rule 13d-1(b)
- Rule 13d-1(c)
- Rule 13d-1(d)

*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 the disclosures provided in a prior cover page.

The information required in 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.
I.R.S. Identification Nos. of above persons (entities only).

RA Capital Management, LLC

2. Check the Appropriate Box if a Member of a Group (See Instructions)

(a)

(b)

3. SEC Use Only

4. Citizenship or Place of Organization **Massachusetts**

Number of Shares Beneficially Owned by Each Reporting Person With	5.	Sole Voting Power	0 shares
	6.	Shared Voting Power	3,929,016 shares
	7.	Sole Dispositive Power	0 shares
	8.	Shared Dispositive Power	3,929,016 shares

9. Aggregate Amount Beneficially Owned by Each Reporting Person
3,929,016 shares

10. Check if the Aggregate Amount in Row (9) Excludes Certain Shares (See Instructions)

11. Percent of Class Represented by Amount in Row (9)
9.9%

12. Type of Reporting Person (See Instructions)
IA

-
1. Names of Reporting Persons.
I.R.S. Identification Nos. of above persons (entities only).

Peter Kolchinsky

2. Check the Appropriate Box if a Member of a Group (See Instructions)

(a)

(b)

3. SEC Use Only
-

4. Citizenship or Place of Organization **United States**
-

Number of Shares Beneficially Owned by Each Reporting Person With	5.	Sole Voting Power	0 shares
	6.	Shared Voting Power	3,929,016 shares
	7.	Sole Dispositive Power	0 shares
	8.	Shared Dispositive Power	3,929,016 shares

9. Aggregate Amount Beneficially Owned by Each Reporting Person
3,929,016 shares
-

10. Check if the Aggregate Amount in Row (9) Excludes Certain Shares (See Instructions)
-

11. Percent of Class Represented by Amount in Row (9)
9.9%
-

12. Type of Reporting Person (See Instructions)
IN
-
-

-
1. Names of Reporting Persons.
I.R.S. Identification Nos. of above persons (entities only).

RA Capital Healthcare Fund, L.P.

2. Check the Appropriate Box if a Member of a Group (See Instructions)

(a)

(b)

3. SEC Use Only
-

4. Citizenship or Place of Organization **Delaware**
-

Number of Shares Beneficially Owned by Each Reporting Person With	5.	Sole Voting Power	0 shares
	6.	Shared Voting Power	3,142,521 shares
	7.	Sole Dispositive Power	0 shares
	8.	Shared Dispositive Power	3,142,521 shares

9. Aggregate Amount Beneficially Owned by Each Reporting Person
3,142,521 shares
-

10. Check if the Aggregate Amount in Row (9) Excludes Certain Shares (See Instructions)
-

11. Percent of Class Represented by Amount in Row (9)
7.9%
-

12. Type of Reporting Person (See Instructions)
PN
-
-

CUSIP No. **042797209**

Item 1.

- (a) **Name of Issuer:** Arrowhead Research Corporation (the “Issuer”).
- (b) **Address of the Issuer’s Principal Executive Offices:** 225 South Lake Avenue, Suite 1050, Pasadena, CA 91101.

Item 2.

- (a) **Name of Person Filing:** This joint statement on Schedule 13G is being filed by Peter Kolchinsky, RA Capital Management, LLC (“Capital”), and RA Capital Healthcare Fund, L.P. (the “Fund”). Mr. Kolchinsky, Capital and the Fund are collectively referred to herein as the “Reporting Persons.”
- (b) **Address of Principal Business Office:** The principal business office of the Reporting Persons is c/o RA Capital Management, LLC, 20 Park Plaza, Suite 1200, Boston, MA 02116.
- (c) **Citizenship:** Capital is a Massachusetts limited liability company. The Fund is a Delaware limited partnership. Mr. Kolchinsky is a United States citizen.
- (d) **Title and Class of Securities:** Common stock (“Common Stock”).
- (e) **CUSIP Number:** 042797209

Item 3. If this statement is filed pursuant to §§240.13d-1(b) or 240.13d-2(b) or (c), check whether the person filing is a:

Not applicable.

Item 4. Ownership:

Provide the following information regarding the aggregate number and percentage of the class of securities of the issuer identified in Item 1.

- (a) Amount Beneficially Owned:**
- RA Capital Management, LLC - 3,929,016 shares
Peter Kolchinsky - 3,929,016 shares
RA Capital Healthcare Fund, L.P. - 3,142,521 shares
- (b) Percent of Class:**
- RA Capital Management, LLC – 9.9%
Peter Kolchinsky – 9.9%
RA Capital Healthcare Fund, L.P. – 7.9%
- (c) Number of shares as to which such person has:
-

- (i) sole power to vote or to direct the vote **

RA Capital Management, LLC - 0 shares
Peter Kolchinsky - 0 shares
RA Capital Healthcare Fund, L.P. - 0 shares

- (ii) shared power to vote or to direct the vote**

RA Capital Management, LLC - 3,929,016 shares
Peter Kolchinsky - 3,929,016 shares
RA Capital Healthcare Fund, L.P. - 3,142,521 shares

- (iii) Sole power to dispose or to direct the disposition of**

RA Capital Management, LLC - 0 shares
Peter Kolchinsky - 0 shares
RA Capital Healthcare Fund, L.P. - 0 shares

- (iv) shared power to dispose or to direct the disposition of**

RA Capital Management, LLC - 3,929,016 shares
Peter Kolchinsky - 3,929,016 shares
RA Capital Healthcare Fund, L.P. - 3,142,521 shares

** Shares reported herein for the Reporting Persons represent shares of Common Stock beneficially owned as set forth below and additional shares of Common Stock issuable upon the conversion of certain shares of Series B Convertible Preferred Stock ("Series B Shares") and Series C Convertible Preferred Stock ("Series C Shares") beneficially owned as set forth below. In the aggregate, the Reporting Persons own 2,991 Series B Shares convertible into 1,634,426 shares of Common Stock and 30,000 Series C Shares convertible into 5,119,720 shares of Common Stock. The Series B Shares and the Series C Shares may not be converted such that the number of shares of Common Stock held by the Reporting Persons and their affiliates after such conversion exceeds 9.99% of the outstanding shares of Common Stock. Shares reported herein for the Fund represent shares of Common Stock held of record by the Fund and additional shares of Common Stock issuable upon the conversion of certain Series B Shares and Series C Shares held of record by the Fund. Shares reported herein for Capital represent (a) the above-referenced shares of Common Stock and additional shares of Common Stock issuable upon the conversion of certain Series B Shares and Series C Shares as reported for the Fund, for which the LLC serves as the sole general partner, and (b) shares of Common Stock held in a separately managed account for which Capital serves as investment adviser, and additional shares of Common Stock issuable upon the conversion of certain Series B Shares and Series C Shares held in such managed account. Shares reported herein for Mr. Kolchinsky represent the above-referenced shares of Common Stock (including additional shares of Common Stock issuable upon the exercise of certain Series B Shares and Series C Shares) reported for Capital, for which Mr. Kolchinsky serves as the manager. Each of the Reporting Persons disclaims beneficial ownership of the shares reported herein except to the extent of its or his pecuniary interest therein.

CUSIP No. **042797209**

Item 5. Ownership of Five Percent or Less of a Class:

Not applicable.

Item 6. Ownership of More than Five Percent on Behalf of Another Person:

Not applicable.

Item 7. Identification and Classification of the Subsidiary Which Acquired the Security Being Reported on By the Parent Holding Company or Control Person:

Not applicable.

Item 8. Identification and Classification of Members of the Group:

Not applicable.

Item 9. Notice of Dissolution of Group:

Not applicable.

Item 10. Certification:

By signing below I hereby certify that, to the best of my knowledge and belief, the securities referred to above were not acquired and are not held for the purpose of or with the effect of changing or influencing the control of the issuer of the securities and were not acquired and are not held in connection with or as a participant in any transaction having that purpose or effect.

Exhibits

1 Joint Filing Agreement by and among the Reporting Persons is incorporated herein by reference to Exhibit 1 to the Schedule 13G filed by the Reporting Persons with the Securities and Exchange Commission on November 14, 2013.

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: February 14, 2014

RA CAPITAL MANAGEMENT, LLC

By: /s/ Peter Kolchinsky

Peter Kolchinsky
Manager

PETER KOLCHINSKY

/s/ Peter Kolchinsky

RA CAPITAL HEALTHCARE FUND, L.P.

By: RA Capital Management, LLC
General Partner

By: /s/ Peter Kolchinsky

Peter Kolchinsky
Manager
