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

FORM 8-K/A
(Amendment No. 1)

CURRENT REPORT
Pursuant to Section 13 or 15(d)
of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): March 11, 2019

X4 Pharmaceuticals, Inc.
(Exact name of registrant as specified in its charter)

Delaware	**001-38295**	**27-3181608**
(State or other jurisdiction of incorporation)	**(Commission File Number)**	**(IRS Employer Identification No.)**

955 Massachusetts Avenue, 4th Floor **Cambridge, Massachusetts**	**02139**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (857) 529-8300

Not applicable
(Former name or former address, if changed since last report.)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instruction A.2. below):

☐ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

☐ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)

☐ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))

☐ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

Emerging growth company ☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☒

Explanatory Note

On March 13, 2019, X4 Pharmaceuticals, Inc., formerly Arsanis, Inc. (the "Company" or "Arsanis"), filed a Current Report on Form 8-K (the "Original Form 8-K") to report that, among other things, on March 13, 2019, the Company completed its business combination with X4 Therapeutics, Inc., formerly X4 Pharmaceuticals, Inc. ("X4"), in accordance with the terms of that certain Agreement and Plan of Merger, dated as of November 26, 2018, as amended on December 20, 2018 and March 8, 2019 (the "Merger Agreement"), by and among the Company, X4 and Artemis AC Corp., a Delaware corporation and a wholly owned subsidiary of the Company ("Merger Sub").

This amendment to the Original Form 8-K is being filed to (i) include the audited financial statements of X4 and the pro forma financial information of the Company and X4 required by Items 9.01(a) and 9.01(b) of Form 8-K, respectively, and (ii) attach herewith as Exhibit 10.1.2 a revised Form of Stock Option Agreement under the 2015 Employee, Director and Consultant Equity Incentive Plan, as amended. Except as set forth in this amendment to the Original Form 8-K, no other changes are being made to the Original Form 8-K.

Item 9.01. Financial Statements and Exhibits.

(a) Financial statements of business acquired.

The audited consolidated financial statements of X4 for the years ended December 31, 2018, 2017 and 2016 are filed herewith as Exhibit 99.1 and are incorporated herein by reference. The consent of PricewaterhouseCoopers LLP, X4's independent registered public accounting firm, is attached hereto as Exhibit 23.1.

(b) Pro forma financial information.

The unaudited pro forma combined financial information of Arsanis and X4 for the year ended December 31, 2018 are filed herewith as Exhibit 99.2 and are incorporated herein by reference.

(d) Exhibits.

Exhibit No.	Description
10.1.2@	Form of Stock Option Agreement under the 2015 Employee, Director and Consultant Equity Incentive Plan, as amended.
23.1	Consent of PricewaterhouseCoopers LLP, independent registered public accounting firm.
99.1	Audited consolidated financial statements of X4 for the years ended December 31, 2018, 2017 and 2016.
99.2	Unaudited pro forma combined financial statements of Arsanis and X4 for the year ended December 31, 2018.

@ Management contract or compensatory plan or arrangement.

SIGNATURE

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

X4 PHARMACEUTICALS, INC.

By: /s/ Paula Ragan, Ph.D.
Paula Ragan, Ph.D.
President and Chief Executive Officer

Date: April 2, 2019

Exhibit 10.1.2

Option No. ________

X4 PHARMACEUTICALS, INC.

Stock Option Grant Notice
Stock Option Grant under the Company's
2015 Employee, Director and Consultant Equity Incentive Plan

1.	Name and Address of Participant:	____________________
		____________________
		____________________
2.	Date of Option Grant:	____________________
3.	Type of Grant:	____________________
4.	Maximum Number of Shares for which this Option is exercisable:	____________________
5.	Exercise (purchase) price per share:	____________________
6.	Option Expiration Date:	____________________
7.	Vesting Start Date[1]:	____________________

8. Vesting Schedule: This Option shall become exercisable (and the Shares issued upon exercise shall be vested) as follows provided the Participant is an Employee, director or Consultant of the Company or of an Affiliate on the applicable vesting date:

On the first anniversary of the Vesting Start Date (25%)	**up to ____________ Shares**[2]
On the last day of each month following the first anniversary of the Vesting Start Date for 36 consecutive calendar months (2.083%)	**an additional __________ Shares**

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[1] This date is only necessary if a company has decided to trigger vesting from a date that is different from the date of option grant such as a hire date and is to be used a point of reference for future vesting only.

[2] If the agreement does not set forth a vesting schedule as to a specific number of shares and a % is used instead consider adding the following to the end of the vesting schedule to address the potential vesting of fractional shares:
"provided that the number of shares vesting on each date shall be rounded down to the nearest whole number, whilst the number of shares vesting on the final date shall be the remaining unvested balance of the Shares."

[Notwithstanding the foregoing, 100% of the then unvested portion of this Option shall vest upon the termination of the Participant's employment by the Company without Cause (as defined in the Plan) upon or at any time within 12 months following a Change of Control. The Participant's employment shall be considered to have been terminated by the Company for Cause if the Company determines, within 30 days after the Participant's resignation, that termination for Cause was warranted.

For purposes of this Option, a "Change of Control" shall mean the occurrence of any of the following events: any "Person" (as such term is used in Sections 13(d) and 14(d) of the Exchange Act) becomes the "Beneficial Owner" (as defined in Rule 13d-3 under the Exchange Act), directly or indirectly, of securities of the Company representing fifty percent (50%) or more of the total voting power represented by the Company's then outstanding voting securities (excluding for this purpose any such voting securities held by the Company, or any affiliate, parent or subsidiary of the Company, or by any employee benefit plan of the Company) pursuant to a transaction or a series of related transactions which the Board of Directors does not approve; or (ii) (A) A merger or consolidation of the Company whether or not approved by the Board of Directors, other than a merger or consolidation which would result in the voting securities of the Company outstanding immediately prior thereto continuing to represent (either by remaining outstanding or by being converted into voting securities of the surviving entity or the parent of such corporation) at least fifty percent (50%) of the total voting power represented by the voting securities of the Company or such surviving entity or parent of such corporation, as the case may be, outstanding immediately after such merger or consolidation; or (B) the sale or disposition by the Company of all or substantially all of the Company's assets.]

The foregoing rights are cumulative and are subject to the other terms and conditions of this Agreement and the Plan.

The Company and the Participant acknowledge receipt of this Stock Option Grant Notice and agree to the terms of the Stock Option Agreement attached hereto and incorporated by reference herein, the Company's 2015 Employee, Director and Consultant Equity Incentive Plan and the terms of this Option Grant as set forth above.

X4 PHARMACEUTICALS, INC.

By: ______________________________
Name: ______________________________
Title: ______________________________

____
Participant

X4 PHARMACEUTICALS, INC.

STOCK OPTION AGREEMENT - INCORPORATED TERMS AND CONDITIONS

AGREEMENT made as of the date of grant set forth in the Stock Option Grant Notice by and between X4 Pharmaceuticals, Inc. (the "Company"), a Delaware corporation, and the individual whose name appears on the Stock Option Grant Notice (the "Participant").

WHEREAS, the Company desires to grant to the Participant an Option to purchase shares of its common stock, $0.001 par value per share (the "Shares"), under and for the purposes set forth in the Company's 2015 Employee, Director and Consultant Equity Incentive Plan (the "Plan");

WHEREAS, the Company and the Participant understand and agree that any terms used and not defined herein have the same meanings as in the Plan; and

WHEREAS, the Company and the Participant each intend that the Option granted herein shall be of the type set forth in the Stock Option Grant Notice.

NOW, THEREFORE, in consideration of the mutual covenants hereinafter set forth and for other good and valuable consideration, the parties hereto agree as follows:

1. GRANT OF OPTION.

The Company hereby grants to the Participant the right and option to purchase all or any part of an aggregate of the number of Shares set forth in the Stock Option Grant Notice, on the terms and conditions and subject to all the limitations set forth herein, under United States securities and tax laws, and in the Plan, which is incorporated herein by reference. The Participant acknowledges receipt of a copy of the Plan.

2. EXERCISE PRICE.

The exercise price of the Shares covered by the Option shall be the amount per Share set forth in the Stock Option Grant Notice, subject to adjustment, as provided in the Plan, in the event of a stock split, reverse stock split or other events affecting the holders of Shares after the date hereof (the "Exercise Price"). Payment shall be made in accordance with Paragraph 9 of the Plan.

3. EXERCISABILITY OF OPTION.

Subject to the terms and conditions set forth in this Agreement and the Plan, the Option granted hereby shall become vested and exercisable as set forth in the Stock Option Grant Notice and is subject to the other terms and conditions of this Agreement and the Plan.

4. TERM OF OPTION.

This Option shall terminate on the Option Expiration Date as specified in the Stock Option Grant Notice and, if this Option is designated in the Stock Option Grant Notice as an ISO and the Participant owns as of the date hereof more than 10% of the total combined voting power of all classes of capital stock of the Company or an Affiliate, such date may not be more than five years from the date of this Agreement, but shall be subject to earlier termination as provided herein or in the Plan.

If the Participant ceases to be an Employee, director or Consultant of the Company or of an Affiliate for any reason other than the death or Disability of the Participant, or termination of the Participant for Cause (the "Termination Date"), the Option to the extent then vested and exercisable pursuant to Section 3 hereof as of the Termination Date, and not previously terminated in accordance with this Agreement, may be exercised within three months after the Termination Date, or on or prior to the Option Expiration Date as specified in the Stock Option Grant Notice, whichever is earlier, but may not be exercised thereafter except as set forth below. In such event, the unvested portion of the Option shall not be exercisable and shall expire and be cancelled on the Termination Date.

If this Option is designated in the Stock Option Grant Notice as an ISO and the Participant ceases to be an Employee of the Company or of an Affiliate but continues after termination of employment to provide service to the Company or an Affiliate as a director or Consultant, this Option shall continue to vest in accordance with Section 3 above as if this Option had not terminated until the Participant is no longer providing services to the Company. In such case, this Option shall automatically convert and be deemed a Non-Qualified Option as of the date that is three months from termination of the Participant's employment and this Option shall continue on the same terms and conditions set forth herein until such Participant is no longer providing service to the Company or an Affiliate.

Notwithstanding the foregoing, in the event of the Participant's Disability or death within three months after the Termination Date, the Participant or the Participant's Survivors may exercise the Option within one year after the Termination Date, but in no event after the Option Expiration Date as specified in the Stock Option Grant Notice.

In the event the Participant's service is terminated by the Company or an Affiliate for Cause, the Participant's right to exercise any unexercised portion of this Option even if vested shall cease immediately as of the time the Participant is notified his or her service is terminated for Cause, and this Option shall thereupon terminate. Notwithstanding anything herein to the contrary, if subsequent to the Participant's termination, but prior to the exercise of the Option, the Administrator determines that, either prior or subsequent to the Participant's termination, the Participant engaged in conduct which would constitute Cause, then the Participant shall immediately cease to have any right to exercise the Option and this Option shall thereupon terminate.

In the event of the Disability of the Participant, as determined in accordance with the Plan, the Option shall be exercisable within one year after the Participant's termination of service due to Disability or, if earlier, on or prior to the Option Expiration Date as specified in the Stock Option Grant Notice. In such event, the Option shall be exercisable:

(a) to the extent that the Option has become exercisable but has not been exercised as of the date of the Participant's termination of service due to Disability; and

(b) in the event rights to exercise the Option accrue periodically, to the extent of a pro rata portion through the date of the Participant's termination of service due to Disability of any additional vesting rights that would have accrued on the next vesting date had the Participant not become Disabled. The proration shall be based upon the number of days accrued in the current vesting period prior to the date of the Participant's termination of service due to Disability.

In the event of the death of the Participant while an Employee, director or Consultant of the Company or of an Affiliate, the Option shall be exercisable by the Participant's Survivors within one year after the date of death of the Participant or, if earlier, on or prior to the Option Expiration Date as specified in the Stock Option Grant Notice. In such event, the Option shall be exercisable:

(x) to the extent that the Option has become exercisable but has not been exercised as of the date of death; and

(y) in the event rights to exercise the Option accrue periodically, to the extent of a pro rata portion through the date of death of any additional vesting rights that would have accrued on the next vesting date had the Participant not died. The proration shall be based upon the number of days accrued in the current vesting period prior to the Participant's date of death.

5. METHOD OF EXERCISING OPTION.

Subject to the terms and conditions of this Agreement, the Option may be exercised by written notice to the Company or its designee, in substantially the form of Exhibit A attached hereto (or in such other form acceptable to the Company, which may include electronic notice). Such notice shall state the number of Shares with respect to which the Option is being exercised and shall be signed by the person exercising the Option (which signature may be provided electronically in a form acceptable to the Company). Payment of the Exercise Price for such Shares shall be made in accordance with Paragraph 9 of the Plan. The Company shall deliver such Shares as soon as practicable after the notice shall be received, provided, however, that the Company may delay issuance of such Shares until completion of any action or obtaining of any consent, which the Company deems necessary under any applicable law (including, without limitation, state securities or "blue sky" laws). The Shares as to which the Option shall have been so exercised shall be registered in the Company's share register in the name of the person so exercising the Option (or, if the Option shall be exercised by the Participant and if the Participant shall so request in the notice exercising the Option, shall be registered in the Company's share register in the name of the Participant and another person jointly, with right of survivorship) and shall be delivered as provided above to or upon the written order of the person exercising the Option. In the event the Option shall be exercised, pursuant to Section 4 hereof, by any person other than the Participant, such notice shall be accompanied by appropriate proof of the right of such person to exercise the Option. All Shares that shall be purchased upon the exercise of the Option as provided herein shall be fully paid and nonassessable.

6. PARTIAL EXERCISE.

Exercise of this Option to the extent above stated may be made in part at any time and from time to time within the above limits, except that no fractional share shall be issued pursuant to this Option.

7. NON-ASSIGNABILITY.

The Option shall not be transferable by the Participant otherwise than by will or by the laws of descent and distribution. If this Option is a Non-Qualified Option then it may also be transferred pursuant to a qualified domestic relations order as defined by the Code or Title I of the Employee Retirement Income Security Act or the rules thereunder. Except as provided above in this paragraph, the Option shall be exercisable, during the Participant's lifetime, only by the Participant (or, in the event of legal incapacity or incompetency, by the Participant's guardian or representative) and shall not be assigned, pledged or hypothecated in any way (whether by operation of law or otherwise) and shall not be subject to execution, attachment or similar process. Any attempted transfer, assignment, pledge, hypothecation or other disposition of the Option or of any rights granted hereunder contrary to the provisions of this Section 7, or the levy of any attachment or similar process upon the Option shall be null and void.

8. NO RIGHTS AS STOCKHOLDER UNTIL EXERCISE.

The Participant shall have no rights as a stockholder with respect to Shares subject to this Agreement until registration of the Shares in the Company's share register in the name of the Participant. Except as is expressly provided in the Plan with respect to certain changes in the capitalization of the Company, no adjustment shall be made for dividends or similar rights for which the record date is prior to the date of such registration.

9. ADJUSTMENTS.

The Plan contains provisions covering the treatment of Options in a number of contingencies such as stock splits and mergers. Provisions in the Plan for adjustment with respect to stock subject to Options and the related provisions with respect to successors to the business of the Company are hereby made applicable hereunder and are incorporated herein by reference.

10. TAXES.

The Participant acknowledges and agrees that (i) any income or other taxes due from the Participant with respect to this Option or the Shares issuable upon exercise of this Option shall be the Participant's responsibility; (ii) the Participant was free to use professional advisors of his or her choice in connection with this Agreement, has received advice from his or her professional advisors in connection with this Agreement, understands its meaning and import, and is entering into this Agreement freely and without coercion or duress; (iii) the Participant has not received and is not relying upon any advice, representations or assurances made by or on behalf of the Company or any Affiliate or any employee of or counsel to the Company or any Affiliate regarding any tax or other effects or implications of the Option, the Shares or other matters contemplated by this Agreement and (iv) neither the Administrator, the Company, its Affiliates, nor any of its officers or directors, shall be held liable for any applicable costs, taxes, or penalties associated with the Option if, in fact, the Internal Revenue Service were to determine that the Option constitutes deferred compensation under Section 409A of the Code.

If this Option is designated in the Stock Option Grant Notice as a Non-Qualified Option or if the Option is converted into a Non-Qualified Option and such Non-Qualified Option is exercised, the Participant agrees that the Company may withhold from the Participant's remuneration, if any, the minimum statutory amount of federal, state and local withholding taxes attributable to such amount that is considered compensation includable in such person's gross income. At the Company's discretion, the amount required to be withheld may be withheld in cash from such remuneration, or in kind from the Shares otherwise deliverable to the Participant on exercise of the Option. The Participant further agrees that, if the Company does not withhold an amount from the Participant's remuneration sufficient to satisfy the Company's income tax withholding obligation, the Participant will reimburse the Company on demand, in cash, for the amount under-withheld.

11. PURCHASE FOR INVESTMENT.

Unless the offering and sale of the Shares to be issued upon the particular exercise of the Option shall have been effectively registered under the Securities Act of 1933, as now in force or hereafter amended (the "1933 Act"), the Company shall be under no obligation to issue the Shares covered by such exercise unless the Company has determined that such exercise and issuance would be exempt from the registration requirements of the 1933 Act and until the following conditions have been fulfilled:

(a) The person(s) who exercise the Option shall warrant to the Company, at the time of such exercise, that such person(s) are acquiring such Shares for their own respective accounts, for investment, and not with a view to, or for sale in connection with, the distribution of any such Shares, in which event the person(s) acquiring such Shares shall be bound by the provisions of the following legend which shall be endorsed upon any certificate(s) evidencing the Shares issued pursuant to such exercise:

> "The shares represented by this certificate have been taken for investment and they may not be sold or otherwise transferred by any person, including a pledgee, unless (1) either (a) a Registration Statement with respect to such shares shall be effective under the Securities Act of 1933, as amended, or (b) the Company shall have received an opinion of counsel satisfactory to it that an exemption from registration under such Act is then available, and (2) there shall have been compliance with all applicable state securities laws;" and

(b) If the Company so requires, the Company shall have received an opinion of its counsel that the Shares may be issued upon such particular exercise in compliance with the 1933 Act without registration thereunder. Without limiting the generality of the foregoing, the Company may delay issuance of the Shares until completion of any action or obtaining of any consent, which the Company deems necessary under any applicable law (including without limitation state securities or "blue sky" laws).

12. RESTRICTIONS ON TRANSFER OF SHARES.

12.1 The Shares acquired by the Participant pursuant to the exercise of the Option granted hereby shall not be transferred by the Participant except as permitted herein.

12.2 In the event of the Participant's termination of service for any reason, the Company shall have the option, but not the obligation, to repurchase all or any part of the Shares issued pursuant to this Agreement (including, without limitation, Shares purchased after termination of service, Disability or death in accordance with Section 4 hereof). In the event the Company does not, upon the termination of service of the Participant (as described above), exercise its option pursuant to this Section 12.2, the restrictions set forth in the balance of this Agreement shall not thereby lapse, and the Participant for himself or herself, his or her heirs, legatees, executors, administrators and other successors in interest, agrees that the Shares shall remain subject to such restrictions. The following provisions shall apply to a repurchase under this Section 12.2:

(i) The per share repurchase price of the Shares to be sold to the Company upon exercise of its option under this Section 12.2 shall be equal to the Fair Market Value of each such Share determined in accordance with the Plan as of the date of repurchase provided, however, in the event of a termination by the Company for Cause, the per share repurchase price of the Shares to be sold to the Company upon exercise of its option under this Section 12.2 shall be equal to the lesser of the Exercise Price and the Fair Market Value on the date of the repurchase.

(ii) The Company's option to repurchase the Participant's Shares in the event of termination of service shall be valid for a period of 12 months commencing with the date of such termination of service.

(iii) In the event the Company shall be entitled to and shall elect to exercise its option to repurchase the Participant's Shares under this Section 12.2, the Company shall notify the Participant, or in case of death, his or her Survivor, in writing of its intent to repurchase the Shares. Such written notice may be mailed by the Company up to and including the last day of the time period provided for in Section 12.2(ii) for exercise of the Company's option to repurchase.

(iv) The written notice to the Participant shall specify the address at, and the time and date on, which payment of the repurchase price is to be made (the "Closing"). The date specified shall not be less than ten days nor more than 60 days from the date of the mailing of the notice, and the Participant or his or her successor in interest with respect to the Shares shall have no further rights as the owner thereof from and after the date specified in the notice. At the Closing, the repurchase price shall be delivered to the Participant or his or her successor in interest and the Shares being purchased, duly endorsed for transfer, shall, to the extent that they are not then in the possession of the Company, be delivered to the Company by the Participant or his or her successor in interest.

12.3 It shall be a condition precedent to the validity of any sale or other transfer of any Shares by the Participant that the following restrictions be complied with (except as otherwise provided in this Section 12):

(i) No Shares owned by the Participant may be sold, pledged or otherwise transferred (including by gift or devise) to any person or entity, voluntarily, or by operation of law, except in accordance with the terms and conditions hereinafter set forth.

(ii) Before selling or otherwise transferring all or part of the Shares, the Participant shall give written notice of such intention to the Company, which notice shall include the name of the proposed transferee, the proposed purchase price per share, the terms of payment of such purchase price and all other matters relating to such sale or transfer and shall be accompanied by a copy of the binding written agreement of the proposed transferee to purchase the Shares of the Participant. Such notice shall constitute a binding offer by the Participant to sell to the Company such number of the Shares then held by the Participant as are proposed to be sold in the notice at the monetary price per share designated in such notice, payable on the terms offered to the Participant by the proposed transferee (provided, however, that the Company shall not be required to meet any non-monetary terms of the proposed transfer, including, without limitation, delivery of other securities in exchange for the Shares proposed to be sold). The Company shall give written notice to the Participant as to whether such offer has been accepted in whole by the Company within 60 days after its receipt of written notice from the Participant. The Company may only accept such offer in whole and may not accept such offer in part. Such acceptance notice shall fix a time, location and date for the Closing on such purchase ("Closing Date") which shall not be less than ten nor more than sixty days after the giving of the acceptance notice, provided, however, if any of the Shares to be sold pursuant to this Section 12.3 have been held by the Participant for less than six months, then the Closing Date may be extended by the Company until no more than ten days after such Shares have been held by the Participant for six months if required under applicable accounting rules in effect at the time. The place for such Closing shall be at the Company's principal office. At such Closing, the Participant shall accept payment as set forth herein and shall deliver to the Company in exchange therefor certificates for the number of Shares stated in the notice accompanied by duly executed instruments of transfer.

(iii) If the Company shall fail to accept any such offer, the Participant shall be free to sell all, but not less than all, of the Shares set forth in his or her notice to the designated transferee at the price and terms designated in the Participant's notice, provided that (i) such sale is consummated within six months after the giving of notice by the Participant to the Company as aforesaid, and (ii) the transferee first agrees in writing to be bound by the provisions of this Section 12 so that such transferee (and all subsequent transferees) shall thereafter only be permitted to sell or transfer the Shares in accordance with the terms hereof. After the expiration of such six months, the provisions of this Section 12.3 shall again apply with respect to any proposed voluntary transfer of the Participant's Shares.

(iv) The provisions of this Section 12.3 may be waived by the Company. Any such waiver may be unconditional or based upon such conditions as the Company may impose.

12.4 In the event that the Participant or his or her successor in interest fails to deliver the Shares to be repurchased by the Company under this Agreement, the Company may elect (a) to establish a segregated account in the amount of the repurchase price, such account to be turned over to the Participant or his or her successor in interest upon delivery of such Shares, and (b) immediately to take such action as is appropriate to transfer record title of such Shares from the Participant to the Company and to treat the Participant and such Shares in all respects as if delivery of such Shares had been made as required by this Agreement. The Participant hereby irrevocably grants the Company a power of attorney which shall be coupled with an interest for the purpose of effectuating the preceding sentence.

12.5 If the Company shall pay a stock dividend or declare a stock split on or with respect to any of its Common Stock, or otherwise distribute securities of the Company to the holders of its Common Stock, the number of shares of stock or other securities of the Company issued with respect to the shares then subject to the restrictions contained in this Agreement shall be added to the Shares subject to the Company's rights to repurchase pursuant to this Agreement. If the Company shall distribute to its stockholders shares of stock of another corporation, the shares of stock of such other corporation, distributed with respect to the Shares then subject to the restrictions contained in this Agreement, shall be added to the Shares subject to the Company's rights to repurchase pursuant to this Agreement.

12.6 If the outstanding shares of Common Stock of the Company shall be subdivided into a greater number of shares or combined into a smaller number of shares, or in the event of a reclassification of the outstanding shares of Common Stock of the Company, or if the Company shall be a party to a merger, consolidation or capital reorganization, there shall be substituted for the Shares then subject to the restrictions contained in this Agreement such amount and kind of securities as are issued in such subdivision, combination, reclassification, merger, consolidation or capital reorganization in respect of the Shares subject immediately prior thereto to the Company's rights to repurchase pursuant to this Agreement.

12.7 The Company shall not be required to transfer any Shares on its books which shall have been sold, assigned or otherwise transferred in violation of this Agreement, or to treat as owner of such Shares, or to accord the right to vote as such owner or to pay dividends to, any person or organization to which any such Shares shall have been so sold, assigned or otherwise transferred, in violation of this Agreement.

12.8 The provisions of Sections 12.1, 12.2 and 12.3 shall terminate upon the effective date of the registration of the Shares pursuant to the Securities Exchange Act of 1934.

12.9 The Participant agrees that in the event the Company proposes to offer for sale to the public any of its equity securities and such Participant is requested by the Company and any underwriter engaged by the Company in connection with such offering to sign an agreement restricting the sale or other transfer of Shares, then it will promptly sign such agreement and will not transfer, whether in privately negotiated transactions or to the public in open market transactions or otherwise, any Shares or other securities of the Company held by him or her during such period as is determined by the Company and the underwriters, not to exceed 180 days following the closing of the offering, plus such additional period of time as may be required to comply with NASD Rule 2711 or similar rules thereto (such period, the “Lock-Up Period”). Such agreement shall be in writing and in form and substance reasonably satisfactory to the Company and such underwriter and pursuant to customary and prevailing terms and conditions. Notwithstanding whether the Participant has signed such an agreement, the Company may impose stop-transfer instructions with respect to the Shares or other securities of the Company subject to the foregoing restrictions until the end of the Lock-Up Period.

12.10 The Participant acknowledges and agrees that neither the Company, its shareholders nor its directors and officers, has any duty or obligation to disclose to the Participant any material information regarding the business of the Company or affecting the value of the Shares before, at the time of, or following a termination of the service of the Participant by the Company, including, without limitation, any information concerning plans for the Company to make a public offering of its securities or to be acquired by or merged with or into another firm or entity.

12.11 All certificates representing the Shares to be issued to the Participant pursuant to this Agreement shall have endorsed thereon a legend substantially as follows: “The shares represented by this certificate are subject to restrictions set forth in a Stock Option Agreement dated ____________, 201__ with this Company, a copy of which Agreement is available for inspection at the offices of the Company or will be made available upon request.”

13. NO OBLIGATION TO MAINTAIN RELATIONSHIP.

The Participant acknowledges that: (i) the Company is not by the Plan or this Option obligated to continue the Participant as an employee, director or Consultant of the Company or an Affiliate; (ii) the Plan is discretionary in nature and may be suspended or terminated by the Company at any time; (iii) the grant of the Option is a one-time benefit which does not create any contractual or other right to receive future grants of options, or benefits in lieu of options; (iv) all determinations with respect to any such future grants, including, but not limited to, the times when options shall be granted, the number of shares subject to each option, the option price, and the time or times when each option shall be exercisable, will be at the sole discretion of the Company; (v) the Participant’s participation in the Plan is voluntary; (vi) the value of the Option is an extraordinary item of compensation which is outside the scope of the Participant’s employment or consulting contract, if any; and (vii) the Option is not part of normal or expected compensation for purposes of calculating any severance, resignation, redundancy, end of service payments, bonuses, long-service awards, pension or retirement benefits or similar payments.

14. IF OPTION IS INTENDED TO BE AN ISO.

If this Option is designated in the Stock Option Grant Notice as an ISO so that the Participant (or the Participant's Survivors) may qualify for the favorable tax treatment provided to holders of Options that meet the standards of Section 422 of the Code then any provision of this Agreement or the Plan which conflicts with the Code so that this Option would not be deemed an ISO is null and void and any ambiguities shall be resolved so that the Option qualifies as an ISO. The Participant should consult with the Participant's own tax advisors regarding the tax effects of the Option and the requirements necessary to obtain favorable tax treatment under Section 422 of the Code, including, but not limited to, holding period requirements.

Notwithstanding the foregoing, to the extent that the Option is designated in the Stock Option Grant Notice as an ISO and is not deemed to be an ISO pursuant to Section 422(d) of the Code because the aggregate Fair Market Value (determined as of the Date of Option Grant) of any of the Shares with respect to which this ISO is granted becomes exercisable for the first time during any calendar year in excess of $100,000, the portion of the Option representing such excess value shall be treated as a Non-Qualified Option and the Participant shall be deemed to have taxable income measured by the difference between the then Fair Market Value of the Shares received upon exercise and the price paid for such Shares pursuant to this Agreement.

Neither the Company nor any Affiliate shall have any liability to the Participant, or any other party, if the Option (or any part thereof) that is intended to be an ISO is not an ISO or for any action taken by the Administrator, including without limitation the conversion of an ISO to a Non-Qualified Option.

15. NOTICE TO COMPANY OF DISQUALIFYING DISPOSITION OF AN ISO.

If this Option is designated in the Stock Option Grant Notice as an ISO then the Participant agrees to notify the Company in writing immediately after the Participant makes a Disqualifying Disposition of any of the Shares acquired pursuant to the exercise of the ISO. A Disqualifying Disposition is defined in Section 424(c) of the Code and includes any disposition (including any sale) of such Shares before the later of (a) two years after the date the Participant was granted the ISO or (b) one year after the date the Participant acquired Shares by exercising the ISO, except as otherwise provided in Section 424(c) of the Code. If the Participant has died before the Shares are sold, these holding period requirements do not apply and no Disqualifying Disposition can occur thereafter.

16. NOTICES.

Any notices required or permitted by the terms of this Agreement or the Plan shall be given by recognized courier service, facsimile, registered or certified mail, return receipt requested, addressed as follows:

If to the Company:

X4 Pharmaceuticals, Inc.
One Broadway, 14th Floor
Cambridge, MA 02142
Attention: President

If to the Participant at the address set forth on the Stock Option Grant Notice or to such other address or addresses of which notice in the same manner has previously been given. Any such notice shall be deemed to have been given upon the earlier of receipt, one business day following delivery to a recognized courier service or three business days following mailing by registered or certified mail.

17. GOVERNING LAW.

This Agreement shall be governed by and construed in accordance with the laws of the State of Delaware, without giving effect to the conflict of law principles thereof. For the purpose of litigating any dispute that arises under this Agreement, the parties hereby consent to exclusive jurisdiction in Massachusetts and agree that such litigation shall be conducted in the state courts of Middlesex County, Massachusetts or the federal courts of the United States for the District of Massachusetts.

18. BENEFIT OF AGREEMENT.

Subject to the provisions of the Plan and the other provisions hereof, this Agreement shall be for the benefit of and shall be binding upon the heirs, executors, administrators, successors and assigns of the parties hereto.

19. ENTIRE AGREEMENT.

This Agreement, together with the Plan, embodies the entire agreement and understanding between the parties hereto with respect to the subject matter hereof and supersedes all prior oral or written agreements and understandings relating to the subject matter hereof. No statement, representation, warranty, covenant or agreement not expressly set forth in this Agreement shall affect or be used to interpret, change or restrict, the express terms and provisions of this Agreement, provided, however, in any event, this Agreement shall be subject to and governed by the Plan.

20. MODIFICATIONS AND AMENDMENTS.

The terms and provisions of this Agreement may be modified or amended as provided in the Plan.

21. WAIVERS AND CONSENTS.

Except as provided in the Plan, the terms and provisions of this Agreement may be waived, or consent for the departure therefrom granted, only by written document executed by the party entitled to the benefits of such terms or provisions. No such waiver or consent shall be deemed to be or shall constitute a waiver or consent with respect to any other terms or provisions of this Agreement, whether or not similar. Each such waiver or consent shall be effective only in the specific instance and for the purpose for which it was given, and shall not constitute a continuing waiver or consent.

22. DATA PRIVACY.

By entering into this Agreement, the Participant: (i) authorizes the Company and each Affiliate, and any agent of the Company or any Affiliate administering the Plan or providing Plan recordkeeping services, to disclose to the Company or any of its Affiliates such information and data as the Company or any such Affiliate shall request in order to facilitate the grant of options and the administration of the Plan; (ii) waives any data privacy rights he or she may have with respect to such information; and (iii) authorizes the Company and each Affiliate to store and transmit such information in electronic form.

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Exhibit A

NOTICE OF EXERCISE OF STOCK OPTION

[Form for Unregistered Shares]

To: X4 Pharmaceuticals, Inc.

Ladies and Gentlemen:

I hereby exercise my Stock Option to purchase ______ shares (the “Shares”) of the common stock, $0.001 par value, of X4 Pharmaceuticals, Inc. (the “Company”), at the exercise price of $_____ per share, pursuant to and subject to the terms of that certain Stock Option Agreement between the undersigned and the Company dated _________, 201_.

I am aware that the Shares have not been registered under the Securities Act of 1933, as amended (the “1933 Act”), or any state securities laws. I understand that the reliance by the Company on exemptions under the 1933 Act is predicated in part upon the truth and accuracy of the statements by me in this Notice of Exercise.

I hereby represent and warrant that (1) I have been furnished with all information which I deem necessary to evaluate the merits and risks of the purchase of the Shares; (2) I have had the opportunity to ask questions concerning the Shares and the Company and all questions posed have been answered to my satisfaction; (3) I have been given the opportunity to obtain any additional information I deem necessary to verify the accuracy of any information obtained concerning the Shares and the Company; and (4) I have such knowledge and experience in financial and business matters that I am able to evaluate the merits and risks of purchasing the Shares and to make an informed investment decision relating thereto.

I hereby represent and warrant that I am purchasing the Shares for my own personal account for investment and not with a view to the sale or distribution of all or any part of the Shares.

I understand that because the Shares have not been registered under the 1933 Act, I must continue to bear the economic risk of the investment for an indefinite time and the Shares cannot be sold unless the Shares are subsequently registered under applicable federal and state securities laws or an exemption from such registration requirements is available.

I agree that I will in no event sell or distribute or otherwise dispose of all or any part of the Shares unless (1) there is an effective registration statement under the 1933 Act and applicable state securities laws covering any such transaction involving the Shares or (2) the Company receives an opinion of my legal counsel (concurred in by legal counsel for the Company) stating that such transaction is exempt from registration or the Company otherwise satisfies itself that such transaction is exempt from registration.

I consent to the placing of a legend on my certificate for the Shares stating that the Shares have not been registered and setting forth the restriction on transfer contemplated hereby and to the placing of a stop transfer order on the books of the Company and with any transfer agents against the Shares until the Shares may be legally resold or distributed without restriction.

I understand that at the present time Rule 144 of the Securities and Exchange Commission (the "SEC") may not be relied on for the resale or distribution of the Shares by me. I understand that the Company has no obligation to me to register the sale of the Shares with the SEC and has not represented to me that it will register the sale of the Shares.

I understand the terms and restrictions on the right to dispose of the Shares set forth in the 2015 Employee, Director and Consultant Equity Incentive Plan and the Stock Option Agreement, both of which I have carefully reviewed. I consent to the placing of a legend on my certificate for the Shares referring to such restriction and the placing of stop transfer orders until the Shares may be transferred in accordance with the terms of such restrictions.

I have considered the Federal, state and local income tax implications of the exercise of my Option and the purchase and subsequent sale of the Shares.

I am paying the option exercise price for the Shares as follows:

____

Please issue the Shares (check one):

☐ to me; or

☐ to me and ________________, as joint tenants with right of survivorship

and mail the certificate to me at the following address:

____

____

____

My mailing address for shareholder communications, if different from the address listed above is:

____

____

____

Very truly yours,

Participant (signature)

Print Name

Date

Social Security Number

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-3 (No. 333-229377) and Form S-8 (Nos. 333-230499, 333-230181, 333-223539 and 333-221622) of X4 Pharmaceuticals, Inc. (formerly known as Arsanis, Inc.) of our report dated April 2, 2019 relating to the financial statements of X4 Therapeutics, Inc. (formerly known as X4 Pharmaceuticals, Inc.), which appears in this Current Report on Form 8-K.

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts
April 2, 2019

EXHIBIT 99.1

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of X4 Therapeutics, Inc. (formerly known as X4 Pharmaceuticals, Inc.)

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of X4 Therapeutics, Inc. (formerly known as X4 Pharmaceuticals, Inc.) and its subsidiary (the "Company") as of December 31, 2018 and 2017, and the related consolidated statements of operations and comprehensive loss, of convertible preferred stock, redeemable common stock and stockholders' deficit and of cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America.

Substantial Doubt About the Company's Ability to Continue as a Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the consolidated financial statements, the Company has incurred recurring losses from operations since inception and will require additional financing to fund future operations that raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits of these consolidated financial statements in accordance with the standards of the PCAOB and in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts
April 2, 2019

We have served as the Company's auditor since 2016.

X4 THERAPEUTICS, INC. (FORMERLY KNOWN AS X4 PHARMACEUTICALS, INC.)

CONSOLIDATED BALANCE SHEETS

(In thousands, except share and per share amounts)

	December 31,	
	2017	**2018**
Assets		
Current assets:		
Cash and cash equivalents	$ 26,684	$ 8,134
Prepaid expenses and other current assets	1,484	1,205
Total current assets	28,168	9,339
Property and equipment, net	344	241
Restricted cash	364	364
Total assets	$ 28,876	$ 9,944
Liabilities, Convertible Preferred Stock, Redeemable Common Stock and Stockholders' Deficit		
Current liabilities:		
Accounts payable	$ 1,662	$ 2,969
Accrued expenses	1,620	3,251
Current portion of long-term debt	1,667	1,687
Preferred stock repurchase liability	587	—
Total current liabilities	5,536	7,907
Preferred stock warrant liability	1,245	4,947
Long-term debt, including accretion, net of discount and current portion	4,381	8,145
Deferred rent, net of current portion	511	417
Other liabilities	111	205
Total liabilities	11,784	21,621
Commitments and contingencies (Note 15)		
Convertible preferred stock (Series Seed, A and B), $0.001 par value; 54,313,523 shares and 59,413,523 shares authorized as of December 31, 2017 and 2018, respectively; 38,018,968 shares and 40,079,567 shares issued and outstanding as of December 31, 2017 and 2018, respectively; aggregate liquidation preference of $84,067 as of December 31, 2018	60,903	64,675
Redeemable common stock, $0.001 par value; 1,129,823 shares issued and outstanding as of December 31, 2017 and 2018	734	734
Stockholders' deficit:		
Common stock, $0.001 par value; 110,000,000 shares and 116,500,000 shares authorized as of December 31, 2017 and 2018, respectively; 3,689,583 shares and 3,700,583 shares issued and outstanding as of December 31, 2017 and 2018, respectively	4	4
Additional paid-in capital	1,381	2,147
Accumulated deficit	(45,930)	(79,237)
Total stockholders' deficit	(44,545)	(77,086)
Total liabilities, convertible preferred stock, redeemable common stock and stockholders' deficit	$ 28,876	$ 9,944

The accompanying notes are an integral part of these consolidated financial statements.

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X4 THERAPEUTICS, INC. (FORMERLY KNOWN AS X4 PHARMACEUTICALS, INC.)

CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS

(In thousands, except share and per share amounts)

	Year Ended December 31,		
	2016	2017	2018
Operating expenses:			
Research and development	$ 13,098	$ 17,066	$ 20,346
General and administrative	4,789	5,181	8,739
Total operating expenses	17,887	22,247	29,085
Loss from operations	(17,887)	(22,247)	(29,085)
Other income (expense):			
Interest income	27	64	236
Interest expense	(53)	(490)	(720)
Change in fair value of preferred stock warrant liability	48	1,360	(3,398)
Change in fair value of derivative liability	—	(94)	(89)
Loss on preferred stock repurchase liability	—	(587)	—
Loss on extinguishment of debt	—	—	(229)
Total other income (expense), net	22	253	(4,200)
Net loss and comprehensive loss	(17,865)	(21,994)	(33,285)
Accruing dividends on Series A convertible preferred stock	(3,008)	(3,000)	(3,000)
Adjustment to accumulated deficit in connection with repurchase of Series Seed convertible preferred stock	—	—	(22)
Net loss attributable to common stockholders	$ (20,873)	$ (24,994)	$ (36,307)
Net loss per share attributable to common stockholders—basic and diluted	$ (4.38)	$ (5.19)	$ (7.52)
Weighted average common shares outstanding—basic and diluted	4,765,234	4,818,327	4,826,910

The accompanying notes are an integral part of these consolidated financial statements

X4 THERAPEUTICS, INC. (FORMERLY KNOWN AS X4 PHARMACEUTICALS, INC.)

CONSOLIDATED STATEMENTS OF CONVERTIBLE PREFERRED STOCK, REDEEMABLE COMMON STOCK AND STOCKHOLDERS' DEFICIT

(In thousands, except share amounts)

	Series Seed, A and B Convertible Preferred Stock		Redeemable Common Stock		Common Stock		Additional Paid-In Capital	Accumulated Deficit	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount	Shares	Amount			
Balances at December 31, 2015	22,061,973	$ 34,307	1,129,823	$ 734	3,625,000	$ 4	$ 357	$ (6,071)	$ (5,710)
Exercise of stock options	—	—	—	—	50,000	—	11	—	11
Stock-based compensation expense	—	—	—	—	—	—	512	—	512
Net loss	—	—	—	—	—	—	—	(17,865)	(17,865)
Balances at December 31, 2016	22,061,973	34,307	1,129,823	734	3,675,000	4	880	(23,936)	(23,052)
Issuance of Series B convertible preferred stock, net of issuance costs of $2,586	15,956,995	26,596	—	—	—	—	—	—	—
Exercise of stock options	—	—	—	—	14,583	—	9	—	9
Stock-based compensation expense	—	—	—	—	—	—	492	—	492
Net loss	—	—	—	—	—	—	—	(21,994)	(21,994)
Balances at December 31, 2017	38,018,968	60,903	1,129,823	734	3,689,583	4	1,381	(45,930)	(44,545)
Repurchase of Series Seed convertible preferred stock, net of issuance costs of $11	(598,975)	(517)	—	—	—	—	—	(22)	(22)
Issuance of Series B convertible preferred stock, net of issuance costs of $539	2,659,574	4,289	—	—	—	—	—	—	—
Exercise of stock options	—	—	—	—	11,000	—	7	—	7
Stock-based compensation expense	—	—	—	—	—	—	759	—	759
Net loss	—	—	—	—	—	—	—	(33,285)	(33,285)
Balances at December 31, 2018	40,079,567	$ 64,675	1,129,823	$ 734	3,700,583	$ 4	$ 2,147	$ (79,237)	$ (77,086)

The accompanying notes are an integral part of these consolidated financial statements

X4 THERAPEUTICS, INC. (FORMERLY KNOWN AS X4 PHARMACEUTICALS, INC.)

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)

	Year Ended December 31,		
	2016	**2017**	**2018**
Cash flows from operating activities:			
Net loss	$(17,865)	$(21,994)	$(33,285)
Adjustments to reconcile net loss to net cash used in operating activities:			
Stock-based compensation expense	512	492	759
Depreciation and amortization expense	20	71	103
Non-cash interest expense	53	157	152
Change in fair value of preferred stock warrant liability	(48)	(1,360)	3,398
Change in fair value of derivative liability	—	94	89
Loss on preferred stock repurchase liability	—	587	—
Loss on extinguishment of debt	—	—	229
Changes in operating assets and liabilities:			
Prepaid expenses and other current assets	(1,732)	402	279
Accounts payable	1,697	(1,169)	1,307
Accrued expenses	418	784	1,631
Deferred rent	—	625	(82)
Net cash used in operating activities	(16,945)	(21,311)	(25,420)
Cash flows from investing activities:			
Purchases of property and equipment	(39)	(378)	—
Net cash used in investing activities	(39)	(378)	—
Cash flows from financing activities:			
Proceeds from issuance of Series B convertible preferred stock, net of issuance costs	—	27,413	4,461
Proceeds from borrowings under loan and security agreements	—	6,000	10,000
Proceeds from exercise of stock options	11	9	7
Repurchase of Series Seed convertible preferred stock	—	—	(1,126)
Repayments of borrowings under loan and security agreement	—	—	(6,380)
Payments of debt issuance costs	(89)	—	(92)
Net cash provided by (used in) financing activities	(78)	33,422	6,870
Net increase (decrease) in cash, cash equivalents and restricted cash	(17,062)	11,733	(18,550)
Cash, cash equivalents and restricted cash at beginning of period	32,377	15,315	27,048
Cash, cash equivalents and restricted cash at end of period	$ 15,315	$ 27,048	$ 8,498
Supplemental disclosure of cash flow information:			
Cash paid for interest	$ —	$ 282	$ 540
Supplemental disclosure of non-cash investing and financing activities:			
Initial fair value of derivative liability in connection with loan and security agreement	$ —	$ —	$ 18
Issuance of warrants in connection with Series B convertible preferred stock financing	$ —	$ 817	$ 172
Issuance of warrants in connection with loan and security agreements	$ 74	$ —	$ 132

The accompanying notes are an integral part of these consolidated financial statements.

X4 THERAPEUTICS, INC.
(FORMERLY KNOWN AS X4 PHARMACEUTICALS, INC.)

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(Amounts in thousands, except share and per share amounts)

1. Nature of the Business and Basis of Presentation

X4 Therapeutics, Inc. (formerly known as X4 Pharmaceuticals, Inc.) (together with its subsidiary, "X4" or the "Company") is a clinical-stage biotechnology research and development company focused on the discovery, development and commercialization of novel therapeutics for the treatment of rare diseases. The Company was formed on October 2, 2012 as X4 Pharmaceuticals, LLC, and was subsequently incorporated on July 15, 2014 as X4 Pharmaceuticals, Inc. under the laws of the State of Delaware. The Company is headquartered in Cambridge, Massachusetts.

The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry, including, but not limited to, development by competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with governmental regulations and the ability to secure additional capital to fund operations. Drug candidates currently under development will require extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel, and infrastructure and extensive compliance-reporting capabilities. Even if the Company's drug development efforts are successful, it is uncertain when, if ever, the Company will realize significant revenue from product sales.

The accompanying consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP") and include the accounts of the Company and its wholly owned subsidiary, X4 Pharmaceuticals Securities Corporation. All intercompany accounts and transactions have been eliminated in consolidation.

Merger with Arsanis

On November 26, 2018, Arsanis, Inc., a publicly held Delaware corporation ("Arsanis"), Artemis AC Corp., a Delaware corporation and a wholly owned subsidiary of Arsanis ("Merger Sub"), and the Company entered into an Agreement and Plan of Merger, as amended on December 20, 2018 and March 8, 2019 (the "Merger Agreement"), pursuant to which the Merger Sub would merge with and into the Company, with the Company surviving the merger as a wholly owned subsidiary of Arsanis. The transactions described in the foregoing sentence may be referred to in these Notes to Consolidated Financial Statements as "the merger" or "the merger with Arsanis." The merger was completed on March 13, 2019 pursuant to the terms of the Merger Agreement.

Pursuant to the terms of the Merger Agreement, upon closing of the merger, all of the Company's outstanding common stock and convertible preferred stock was exchanged for common stock of Arsanis and all outstanding options exercisable for common stock and warrants exercisable for convertible preferred stock of the Company were exchanged for options and warrants exercisable for common stock of Arsanis. In addition, immediately following the closing of the merger, the combined organization effected a 6-for-1 reverse stock split of its common stock and changed its name to X4 Pharmaceuticals, Inc. In connection with the merger, the Company changed its name to X4 Therapeutics, Inc. Following the closing of the merger, X4 Therapeutics, Inc. is a wholly owned subsidiary of X4 Pharmaceuticals, Inc. (see Note 17). Except as noted otherwise, the accompanying consolidated financial statements and notes of the Company do not give effect to this reverse stock split.

The business combination will be accounted for as a reverse merger in accordance with GAAP. Under this method of accounting, the Company is deemed to be the accounting acquirer for financial reporting purposes. This determination was primarily based on the facts that, immediately following the merger: (i) the Company's stockholders own a substantial majority of the voting rights in the combined organization, (ii) the Company

designated a majority of the members of the initial board of directors of the combined organization and (iii) the Company's senior management hold all key positions in the senior management of the combined organization. Accordingly, for accounting purposes, the business combination will be treated as the equivalent of the Company issuing stock to acquire the net assets of Arsanis. As a result, as of the closing date of the merger, the net assets of Arsanis will be recorded at their acquisition-date fair values in the financial statements of the Company and the reported operating results prior to the business combination will be those of the Company. In addition, transaction costs incurred by the Company in connection with the business combination will be expensed as incurred.

Going Concern

In accordance with Accounting Standards Update ("ASU") No. 2014-15, *Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern (Subtopic 205-40)*, the Company has evaluated whether there are certain conditions and events, considered in the aggregate, that raise substantial doubt and the Company's ability to continue as a going concern within one year after the date that the consolidated financial statements are issued.

Since its inception, the Company has funded its operations primarily with proceeds from sales of convertible preferred stock (including proceeds from convertible debt, which converted into convertible preferred stock) and borrowings under loan and security agreements. The Company has incurred recurring losses since its inception, including net losses of $17,865, $21,994 and $33,285 for the years ended December 31, 2016, 2017 and 2018, respectively. In addition, as of December 31, 2018, the Company had an accumulated deficit of $79,237. The Company expects to continue to generate operating losses for the foreseeable future. As of April 2, 2019, the issuance date of the annual consolidated financial statements for the year ended December 31, 2018, the Company expects that its cash and cash equivalents, including cash and cash equivalents received in connection with closing of the merger with Arsanis, will be sufficient to fund its operating expenses, capital expenditure requirements and debt service payments into the third quarter of 2019. The future viability of the Company beyond that point is dependent on its ability to raise additional capital to finance its operations.

The Company plans to seek additional funding through equity financings, debt financings or other capital sources, including collaborations with other companies or other strategic transactions. The Company may not be able to obtain financing on acceptable terms, or at all. The terms of any financing may adversely affect the holdings or the rights of the combined organization's stockholders.

If the Company is unable to obtain funding, the Company will be forced to delay, reduce or eliminate some or all of its research and development programs, product portfolio expansion or commercialization efforts, which could adversely affect its business prospects, or the Company may be unable to continue operations. Although management continues to pursue these plans, there is no assurance that the Company will be successful in obtaining sufficient funding on terms acceptable to the Company to fund continuing operations, if at all.

Based on its recurring losses from operations incurred since inception, expectation of continuing operating losses for the foreseeable future, and need to raise additional capital to finance its future operations, as of April 2, 2019, the issuance date of the annual consolidated financial statements for the year ended December 31, 2018, the Company has concluded that there is substantial doubt about its ability to continue as a going concern within one year after the date that the consolidated financial statements are issued.

X4 THERAPEUTICS, INC.
(FORMERLY KNOWN AS X4 PHARMACEUTICALS, INC.)

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(Amounts in thousands, except share and per share amounts)

The accompanying consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty. Accordingly, the consolidated financial statements have been prepared on a basis that assumes the Company will continue as a going concern and which contemplates the realization of assets and satisfaction of liabilities and commitments in the ordinary course of business.

2. Summary of Significant Accounting Policies

Use of Estimates

The preparation of the Company's consolidated financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the consolidated financial statements, and the reported amounts of expenses during the reporting period. Significant estimates and assumptions reflected in these consolidated financial statements include, but are not limited to, the accrual of research and development expenses and the valuations of common stock, stock options, preferred stock warrants (and the resulting preferred stock warrant liability), derivative instruments (and the resulting derivative liability), and the preferred stock repurchase liability. The Company bases its estimates on historical experience, known trends and other market-specific or other relevant factors that it believes to be reasonable under the circumstances. On an ongoing basis, management evaluates its estimates when there are changes in circumstances, facts and experience. Changes in estimates are recorded in the period in which they become known. Actual results could differ from those estimates.

Concentrations of Credit Risk and Significant Suppliers

Financial instruments that potentially subject the Company to concentrations of credit risk consist principally of cash and cash equivalents. The Company generally maintains balances in various operating accounts at financial institutions that management believes to be of high credit quality, in amounts that may exceed federally insured limits. The Company has not experienced any losses related to its cash and cash equivalents. At December 31, 2017 and 2018, all of the Company's cash and cash equivalents were held at one financial institution.

The Company is dependent on third-party manufacturers to supply products for research and development activities in its programs. In particular, the Company relies and expects to continue to rely on a small number of manufacturers to supply it with its requirements for the active pharmaceutical ingredients and formulated drugs related to these programs. These programs could be adversely affected by a significant interruption in these manufacturing services or in the supply of active pharmaceutical ingredients and formulated drugs.

Cash Equivalents

The Company considers all highly liquid investments with maturities of three months or less at the date of purchase to be cash equivalents. Cash equivalents consisted of money market funds as of December 31, 2017 and 2018.

Restricted Cash

In connection with the Company's lease agreement entered into January 2017 (see Note 15), the Company maintains a letter of credit of $264 for the benefit of the landlord. As of December 31, 2017 and 2018, the

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underlying cash balance securing this letter of credit was classified as restricted cash (non-current) on its consolidated balance sheets.

As of December 31, 2017 and 2018, the Company was required to maintain a separate cash balance of $100 to collateralize corporate credit cards with a bank, which was classified as restricted cash (non-current) on its consolidated balance sheets.

Deferred Offering Costs

The Company capitalizes certain legal, professional accounting and other third-party fees that are directly associated with in-process equity financings as deferred offering costs until such financings are consummated. After consummation of an equity financing, these costs are recorded in stockholders' deficit as a reduction of additional paid-in capital generated as a result of the offering or as a reduction to the carrying value of convertible preferred stock. If an in-process equity financing is abandoned, the deferred offering costs will be expensed immediately as a charge to operating expenses in the consolidated statements of operations and comprehensive loss. As of December 31, 2017 and 2018, the Company had no deferred offering costs.

Property and Equipment

Property and equipment are stated at cost less accumulated depreciation and amortization. Depreciation and amortization expense is recognized using the straight-line method over the estimated useful life of each asset, as follows:

	Estimated Useful Life
Office furniture	3 years
Computer equipment	3 years
Software	3 years
Leasehold improvements	Shorter of lease term or 10 years

Estimated useful lives are periodically assessed to determine if changes are appropriate. Maintenance and repairs are charged to expense as incurred. When assets are retired or otherwise disposed of, the cost of these assets and related accumulated depreciation or amortization are eliminated from the consolidated balance sheet and any resulting gains or losses are included in the consolidated statement of operations and comprehensive loss in the period of disposal. Costs for capital assets not yet placed into service are capitalized as construction-in-progress and depreciated once placed into service. Assets held under capital leases are stated at the lesser of the present value of future minimum lease payments or the fair value of the leased asset at the inception of the lease. Amortization of assets held under capital leases is computed using the straight-line method over the shorter of the estimated useful life of the asset or the period of the related lease.

Impairment of Long-Lived Assets

Long-lived assets consist of property and equipment. Long-lived assets to be held and used are tested for recoverability whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable. Factors that the Company considers in deciding when to perform an impairment review include significant underperformance of the business in relation to expectations, significant negative industry or economic trends and significant changes or planned changes in the use of the assets. If an

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impairment review is performed to evaluate a long-lived asset group for recoverability, the Company compares forecasts of undiscounted cash flows expected to result from the use and eventual disposition of the long-lived asset group to its carrying value. An impairment loss would be recognized in loss from operations when estimated undiscounted future cash flows expected to result from the use of an asset group are less than its carrying amount. The impairment loss would be based on the excess of the carrying value of the impaired asset group over its fair value, determined based on discounted cash flows. The Company did not record any impairment losses on long-lived assets during the years ended December 31, 2016, 2017 or 2018.

Deferred Rent

The Company's lease agreements include payment escalations and lease incentives (including a leasehold improvement tenant allowance), which are accrued or deferred as appropriate such that rent expense is recognized on a straight-line basis over the respective lease terms. Leasehold improvement reimbursements from the landlord are recorded as deferred rent and amortized as reductions to lease expense over the lease term. Adjustments for payment escalations are also recorded as deferred rent and amortized over the lease terms.

Fair Value Measurements

Certain assets and liabilities of the Company are carried at fair value under GAAP. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. Financial assets and liabilities carried at fair value are to be classified and disclosed in one of the following three levels of the fair value hierarchy, of which the first two are considered observable and the last is considered unobservable:

- Level 1—Quoted prices in active markets for identical assets or liabilities.
- Level 2—Observable inputs (other than Level 1 quoted prices), such as quoted prices in active markets for similar assets or liabilities, quoted prices in markets that are not active for identical or similar assets or liabilities, or other inputs that are observable or can be corroborated by observable market data.
- Level 3—Unobservable inputs that are supported by little or no market activity that are significant to determining the fair value of the assets or liabilities, including pricing models, discounted cash flow methodologies and similar techniques.

The Company's preferred stock warrant liability, derivative liability and preferred stock repurchase liability are carried at fair value, determined according to Level 3 inputs in the fair value hierarchy described above (See Note 3). The Company's cash equivalents, consisting of a money market fund invested in U.S. Treasury securities, are carried at fair value, determined based on Level 2 inputs in the fair value hierarchy described above (see Note 3). The carrying values of the Company's accounts payable and accrued expenses approximate their fair values due to the short-term nature of these liabilities. The carrying value of the Company's outstanding long-term debt approximates its fair value because the debt bears interest at a variable market rate.

Segment Information

The Company manages its operations as a single operating segment for the purposes of assessing performance and making operating decisions. The Company's focus is on the discovery, development and

commercialization of novel therapeutics for the treatment of rare diseases. All of the Company’s tangible assets are held in the United States.

Research and Development Costs

Costs associated with internal research and development and external research and development services, including drug development and preclinical studies, are expensed as incurred. Research and development expenses include costs for salaries, employee benefits, subcontractors, facility-related expenses, depreciation and amortization, stock-based compensation, third-party license fees, laboratory supplies, and external costs of outside vendors engaged to conduct discovery, preclinical and clinical development activities and clinical trials as well as to manufacture clinical trial materials, and other costs. The Company recognizes external research and development costs based on an evaluation of the progress to completion of specific tasks using information provided to the Company by its service providers.

Nonrefundable advance payments for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses. Such prepaid expenses are recognized as an expense when the goods have been delivered or the related services have been performed, or when it is no longer expected that the goods will be delivered or the services rendered.

Upfront payments, milestone payments and annual maintenance fees under license agreements are expensed in the period in which they are incurred.

Research Contract Costs and Accruals

The Company has entered into various research and development and other agreements with commercial firms, researchers, universities and others for provisions of goods and services. These agreements are generally cancelable, and the related costs are recorded as research and development expenses as incurred. The Company records accruals for estimated ongoing research and development costs. When evaluating the adequacy of the accrued liabilities, the Company analyzes progress of the studies or clinical trials, including the phase or completion of events, invoices received and contracted costs. Significant judgments and estimates are made in determining the accrued balances at the end of any reporting period. Actual results could differ materially from the Company’s estimates. The Company’s historical accrual estimates have not been materially different from the actual costs.

Patent Costs

All patent-related costs incurred in connection with filing and prosecuting patent applications are expensed as incurred due to the uncertainty about the recovery of the expenditure. Amounts incurred are classified as general and administrative expenses.

Debt Issuance Costs

Debt issuance costs consist of payments made to secure commitments under certain debt financing arrangements. These amounts are recognized as interest expense over the period of the financing arrangement using the effective interest method. If the financing arrangement is canceled or forfeited, or if the utility of the arrangement to the Company is otherwise compromised, these costs are recognized as interest expense immediately. The Company’s consolidated financial statements present debt issuance costs related to a recognized debt liability as a direct reduction from the carrying amount of that debt liability.

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Stock-Based Compensation

The Company measures all stock-based awards granted to employees and directors based on the fair value on the date of the grant and recognizes compensation expense for those awards, net of estimated forfeitures, over the requisite service period, which is generally the vesting period of the respective award. The Company issues stock-based awards with only service-based vesting conditions and records the expense for these awards using the straight-line method. The Company has not issued any stock-based awards with performance-based vesting conditions.

For stock-based awards granted to non-employee consultants, compensation expense is recognized over the period during which services are rendered by such non-employee consultants until completed. At the end of each financial reporting period prior to completion of the service, the fair value of these awards is remeasured using the then-current fair value of the Company's common stock and updated assumption inputs in the Black-Scholes option-pricing model.

The Company classifies stock-based compensation expense in its consolidated statement of operations and comprehensive loss in the same manner in which the award recipient's payroll costs are classified or in which the award recipient's service payments are classified.

The Company recognizes compensation expense for only the portion of awards that are expected to vest. In developing a forfeiture rate estimate, the Company has considered its historical experience to estimate pre-vesting forfeitures for service-based awards. The impact of a forfeiture rate adjustment will be recognized in full in the period of adjustment, and if the actual forfeiture rate is materially different from the Company's estimate, the Company may be required to record adjustments to stock-based compensation expense in future periods.

The fair value of each stock option grant is estimated on the date of grant using the Black-Scholes option-pricing model. The Company historically has been a private company and lacks company-specific historical and implied volatility information for its stock. Therefore, the Company estimates its expected stock price volatility based on the historical volatility of publicly traded peer companies and expects to continue to do so until such time as it has adequate historical data regarding the volatility of its own traded stock price. The expected term of the Company's stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla" options. The expected term of stock options granted to non-employee consultants is equal to the contractual term of the option award. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company has never paid cash dividends on common stock and does not expect to pay any cash dividends in the foreseeable future.

Preferred Stock Warrant Liability

The Company classifies warrants for the purchase of shares of its convertible preferred stock (see Note 8) as a liability on its consolidated balance sheets as these warrants are freestanding financial instruments that may require the Company to transfer assets upon exercise. The warrant liability, which consists of warrants for the purchase of Series A and Series B convertible preferred stock, was initially recorded at fair value upon the date of issuance of each warrant and is subsequently remeasured to fair value at each reporting date. Changes in the fair value of the warrant liability are recognized as a component of other income (expense), net in the

consolidated statement of operations and comprehensive loss. Changes in the fair value of each warrant comprising the preferred stock warrant liability will continue to be recognized until each respective warrant is exercised, expires or qualifies for equity classification (see Note 8).

Derivative Liability

The Company's license agreement with Genzyme Corporation ("Genzyme") (see Note 12) contains a contingent payment obligation that requires the Company to make a cash payment to Genzyme upon a change of control event of the Company. The contingent payment obligation meets the definition of a derivative instrument as the contingent payment obligation is not clearly and closely related to its host instrument and is a cash-settled liability. Accordingly, the Company classifies this derivative as a liability within other liabilities (non-current) on its consolidated balance sheet. The derivative liability was initially recorded at fair value on the date of entering into the license agreement and is subsequently remeasured to fair value at each reporting date. Changes in the fair value of this derivative liability are recognized as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss. Changes in the fair value of this derivative liability will continue to be recognized until a change of control event occurs or until the license agreement is terminated.

In addition, the Company's loan and security agreement (the "Hercules Loan Agreement") with Hercules Capital, Inc. ("Hercules") (see Note 6) contains a redemption feature that, upon an event of default, provides Hercules the option to accelerate and demand repayment of the debt, including a prepayment premium. The redemption feature meets the definition of a derivative instrument as the repayment of the debt contains a substantial premium, resulting in the redemption feature not being clearly and closely related to its host instrument. Accordingly, the Company classifies this derivative as a liability within other liabilities (non-current) on its consolidated balance sheet. The derivative liability was initially recorded at fair value on the date of entering into the Hercules Loan Agreement and is subsequently remeasured to fair value at each reporting date. Changes in the fair value of this derivative liability are recognized as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss. Changes in the fair value of this derivative liability will continue to be recognized until all amounts outstanding under the Hercules Loan Agreement are repaid or until the Hercules Loan Agreement is terminated.

Preferred Stock Repurchase Liability

The Company had classified an agreement to repurchase shares of its Series Seed convertible preferred stock as a liability on its consolidated balance sheet as this repurchase agreement was a freestanding financial instrument that required the Company to transfer assets upon settlement. The preferred stock repurchase liability was initially recorded at fair value on the date of entering into the repurchase agreement and was subsequently remeasured to fair value at each reporting date and upon the settlement date until the settlement of the repurchase agreement, which occurred in January 2018. Changes in the fair value of the preferred stock repurchase liability were recognized as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss.

Comprehensive Loss

Comprehensive loss includes net loss as well as other changes in stockholders' deficit that result from transactions and economic events other than those with stockholders. There was no difference between net loss and comprehensive loss for each of the periods presented in the accompanying consolidated financial statements.

Income Taxes

The Company accounts for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in the consolidated financial statements or in the Company's tax returns. Deferred tax assets and liabilities are determined based on the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. Changes in deferred tax assets and liabilities are recorded in the provision for income taxes. The Company assesses the likelihood that its deferred tax assets will be recovered from future taxable income and, to the extent it believes, based upon the weight of available evidence, that it is more likely than not that all or a portion of the deferred tax assets will not be realized, a valuation allowance is established through a charge to income tax expense. Potential for recovery of deferred tax assets is evaluated by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies.

The Company accounts for uncertainty in income taxes recognized in the consolidated financial statements by applying a two-step process to determine the amount of tax benefit to be recognized. First, the tax position must be evaluated to determine the likelihood that it will be sustained upon external examination by the taxing authorities. If the tax position is deemed more-likely-than-not to be sustained, the tax position is then assessed to determine the amount of benefit to recognize in the consolidated financial statements. The amount of the benefit that may be recognized is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. The provision for income taxes includes the effects of any resulting tax reserves, or unrecognized tax benefits, that are considered appropriate as well as the related net interest and penalties.

Net Income (Loss) per Share

The Company follows the two-class method when computing net income (loss) per share as the Company has issued shares that meet the definition of participating securities. The two-class method determines net income (loss) per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities based upon their respective rights to receive dividends as if all income for the period had been distributed.

Basic net income (loss) per share attributable to common stockholders is computed by dividing the net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding for the period. Diluted net income (loss) attributable to common stockholders is computed by adjusting net income (loss) attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities. Diluted net income (loss) per share attributable to common stockholders is computed by dividing the diluted net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding for the period, including potential dilutive common shares. For purpose of this calculation, outstanding stock options, convertible preferred stock and warrants to purchase shares of convertible preferred stock are considered potential dilutive common shares.

The Company's convertible preferred stock contractually entitles the holders of such shares to participate in dividends but does not contractually require the holders of such shares to participate in losses of the Company. Accordingly, in periods in which the Company reports a net loss attributable to common stockholders, such losses are not allocated to such participating securities. In periods in which the Company reports a net loss

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attributable to common stockholders, diluted net loss per share attributable to common stockholders is the same as basic net loss per share attributable to common stockholders, since dilutive common shares are not assumed to have been issued if their effect is anti-dilutive. The Company reported a net loss attributable to common stockholders for the years ended December 31, 2016, 2017 and 2018.

Recently Adopted Accounting Pronouncements

In May 2014, the FASB issued ASU No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* ("ASU 2014-09"), which supersedes existing revenue recognition guidance under GAAP. The standard's core principle is that a company will recognize revenue when it transfers promised goods or services to customers in an amount that reflects the consideration to which the company expects to be entitled in exchange for those goods or services. The standard defines a five-step process to achieve this principle and will require companies to use more judgment and make more estimates than under the prior guidance. The Company expects that these judgments and estimates will include identifying performance obligations in the customer contract, estimating the amount of variable consideration to include in the transaction price and allocating the transaction price to each separate performance obligation. ASU 2014-09 also requires additional disclosure about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts. In August 2015, the FASB issued ASU No. 2015-14, *Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date*, which delayed the effective date of ASU 2014-09 such that the standard is effective for public entities for annual periods beginning after December 15, 2017 and for interim periods within those fiscal years. The FASB subsequently issued amendments to ASU 2014-09 that have the same effective date and transition date. The Company adopted ASU 2014-09 as of the required effective date of January 1, 2018 and the adoption had no impact on the Company's financial position, results of operations or cash flows as the Company does not currently have any revenue-generating arrangements.

In November 2015, the FASB issued ASU No. 2015-17, *Income Taxes (Topic 740): Balance Sheet Classification of Deferred Taxes* ("ASU 2015-17"). ASU 2015-17 requires deferred tax liabilities and assets to be classified as non-current on the consolidated balance sheet. The amendment may be applied either prospectively to all deferred tax liabilities and assets or retrospectively to all periods presented. The Company adopted ASU 2015-17 as of January 1, 2017 and reflected the adoption retrospectively to all periods presented, and its adoption had no impact on the Company's financial position, results of operations or cash flows.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)* ("ASU 2016-02"), which sets out the principles for the recognition, measurement, presentation and disclosure of leases for both parties to a contract (i.e., lessees and lessors). The new standard requires lessees to apply a dual approach, classifying leases as either finance or operating leases based on the principle of whether or not the lease is effectively a financed purchase by the lessee. This classification will determine whether lease expense is recognized based on an effective interest method or on a straight-line basis over the term of the lease. A lessee is also required to record a right-of-use asset and a lease liability for all leases with a term of greater than 12 months regardless of their classification. Leases with a term of 12 months or less may be accounted for similar to prior guidance for operating leases. For public entities, ASU 2016-02 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within those fiscal years, and early adoption is permitted. ASU 2016-02 initially required adoption using a modified retrospective approach, under which all years presented in the financial statements would be prepared under the revised guidance. In July 2018, the FASB issued *ASU No. 2018-11, Leases (Topic 842),* which added an optional transition method under which financial statements may be prepared under the revised guidance for the year of adoption, but not for prior years. Under the latter

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method, entities will recognize a cumulative catch-up adjustment to the opening balance of accumulated deficit in the period of adoption and will not adjust comparative periods. The Company adopted the new leasing standard as of the required effective date of January 1, 2019 using a modified retrospective transition approach to be applied to leases existing as of, or entered into after, January 1, 2019. The Company is continuing to evaluate the impact of ASU 2016-02. Based on its assessment to date, the Company will record operating lease liabilities and right-of-use assets on its consolidated balance sheet upon adoption of the standard, and the effects of adoption may be material to the consolidated balance sheet as of the adoption date. The Company has not yet completed its assessment of the impact of adoption of ASU 2016-02 on its consolidated statements of operations or cash flows. This standard provides a number of optional practical expedients in transition. The Company plans to apply the package of practical expedients to leases that commenced prior to the effective date, whereby it will elect to not reassess the following: (i) whether any expired or existing contracts contain leases; (ii) the lease classification for any expired or existing leases; and (iii) initial direct costs for any existing leases. The Company expects to elect the short-term lease recognition exemption for all leases that qualify, where a right-of-use asset or lease liability will not be recognized for short-term leases.

In March 2016, the FASB issued ASU No. 2016-09, *Compensation—Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting* (“ASU 2016-09”). ASU 2016-09 addresses several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, an option to recognize gross share compensation expense with actual forfeitures recognized as they occur, and certain classifications on the statement of cash flows. Certain of these changes are required to be applied retrospectively, while other changes are required to be applied prospectively. The Company adopted ASU 2016-09 as of the required effective date of January 1, 2017 and elected to continue to apply an estimated forfeiture rate to stock-based compensation expense. The adoption of ASU 2016-09 had no impact on the Company’s financial position, results of operations or cash flows.

In August 2016, the FASB issued ASU No. 2016-15, *Statement of Cash Flows: Classification of Certain Cash Receipts and Cash Payments (Topic 230)* (“ASU 2016-15”), to address diversity in practice in how certain cash receipts and cash payments are presented in the statement of cash flows. The adoption of ASU 2016-15 is required to be applied retrospectively. The Company adopted ASU 2016-15 as of the required effective date of January 1, 2018, and its adoption had no impact on the Company’s financial position, results of operations or cash flows.

In November 2016, the FASB issued ASU No. 2016-18, *Statement of Cash Flows (Topic 230): Restricted Cash* (“ASU 2016-18”), which requires that the statement of cash flows explain the change during the period in the total of cash, cash equivalents and amounts generally described as restricted cash or restricted cash equivalents. Entities are also required to reconcile such total to amounts on the balance sheet and disclose the nature of the restrictions. As early adoption was permitted, the Company adopted ASU 2016-18 retrospectively as of January 1, 2017. Restricted cash is now included as a component of cash, cash equivalents and restricted cash on the Company’s consolidated statement of cash flows. Upon the adoption of ASU 2016-18, the amount of cash and cash equivalents previously presented on the consolidated statements of cash flows for the year ended December 31, 2016 increased by $55 as of the beginning of the year and by $155 as of the end of the year to reflect the inclusion of restricted cash in the amount reported for changes in cash, cash equivalents and restricted cash. Additionally, as a result of the adoption, transfers between restricted and unrestricted cash are no longer presented as a component of the Company’s investing activities.

In January 2017, the FASB issued ASU No. 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business* (“ASU 2017-01”), which clarifies the definition of a business and provides a screen to

determine when an integrated set of assets and activities is not a business. The screen requires that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set is not a business. For public entities, ASU 2017-01 is effective for annual reporting periods beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is permitted. The Company adopted ASU 2017-01 as of the required effective date of January 1, 2018, and its adoption had no impact on the Company's financial position, results of operations or cash flows. The Company's merger with Arsanis (see Note 1) will be accounted for in accordance with this recently adopted guidance.

In May 2017, the FASB issued ASU No. 2017-09, *Compensation—Stock Compensation (Topic 718): Scope of Modification Accounting* ("ASU 2017-09"). The amendments in ASU 2017-09 clarify that modification accounting is required only if the fair value, the vesting conditions or the classification of the awards (as equity or liability) changes as a result of the change in terms or conditions. The Company adopted ASU 2017-09 as of the required effective date of January 1, 2018. The adoption of ASU 2017-09 did not have a material impact on the Company's financial position, results of operations or cash flows, but will impact the accounting for modifications of stock-based awards, if any, after the date of adoption.

In July 2017, the FASB issued ASU No. 2017-11, *Earnings Per Share (Topic 260), Distinguishing Liabilities from Equity (Topic 480), Derivatives and Hedging (Topic 815) (Part I) Accounting for Certain Financial Instruments with Down Round Features (Part II) Replacement of the Indefinite Deferral for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests with a Scope Exception* ("ASU 2017-11"). Part I applies to entities that issue financial instruments such as warrants, convertible debt or convertible preferred stock that contain down-round features. Part II replaces the indefinite deferral for certain mandatorily redeemable noncontrolling interests and mandatorily redeemable financial instruments of nonpublic entities contained within Accounting Standards Codification ("ASC") Topic 480 with a scope exception and does not impact the accounting for these mandatorily redeemable instruments. For public entities, ASU 2017-11 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within those fiscal years. The Company adopted ASU 2017-11 as of the required effective date of January 1, 2019. The adoption of ASU 2017-11 had no impact on the Company's financial position, results of operations or cash flows.

In June 2018, the FASB issued ASU No. 2018-07, *Compensation—Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting* ("ASU 2018-07"). These amendments expand the scope of *Topic 718, Compensation—Stock Compensation* (which currently only includes share-based payments to employees) to include share-based payments issued to non-employees for goods or services. Consequently, the accounting for share-based payments to non-employees and employees will be substantially aligned. The ASU supersedes *Subtopic 505-50, Equity—Equity-Based Payments to Non-Employees*. This standard is effective for public companies for annual periods beginning after December 15, 2018, including interim periods within those fiscal years, with early adoption permitted as long as ASU 2014-09 has been adopted by the Company. The Company is continuing to evaluate the impact of adopting ASU 2018-07. Based on its assessment to date, the Company does not expect that the adoption of ASU 2018-07 will have a significant impact on its financial position, results of operations or cash flows.

Recently Issued Accounting Pronouncements

In August 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement* ("ASU 2018-13"), which

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removes, adds and modifies certain disclosure requirements for fair value measurements in Topic 820. The Company will no longer be required to disclose the amount of and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy as well as the valuation processes of Level 3 fair value measurements. However, the Company will be required to additionally disclose the changes in unrealized gains and losses included in other comprehensive income for recurring Level 3 fair value measurements and the range and weighted average of assumptions used to develop significant unobservable inputs for Level 3 fair value measurements. ASU 2018-13 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. The amendments relating to additional disclosure requirements will be applied prospectively for only the most recent interim or annual period presented in the initial year of adoption. All other amendments will be applied retrospectively to all periods presented upon their effective date. The Company is currently evaluating the impact that the adoption of ASU 2018-13 will have on its consolidated financial statements.

3. Fair Value of Financial Assets and Liabilities

The following tables present information about the Company's financial assets and liabilities measured at fair value on a recurring basis and indicate the level of the fair value hierarchy used to determine such fair values:

	Fair Value Measurements as of December 31, 2017 Using:			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents — Money market fund	$ —	$ 26,684	$ —	$ 26,684
	$ —	$ 26,684	$ —	$ 26,684
Liabilities:				
Preferred stock warrant liability	$ —	$ —	$ 1,245	$ 1,245
Derivative liability	—	—	94	94
Preferred stock repurchase liability	—	—	587	587
	$ —	$ —	$ 1,926	$ 1,926

	Fair Value Measurements as of December 31, 2018 Using:			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents — Money market fund	$ —	$ 8,134	$ —	$ 8,134
	$ —	$ 8,134	$ —	$ 8,134
Liabilities:				
Preferred stock warrant liability	$ —	$ —	$ 4,947	$ 4,947
Derivative liability	—	—	201	201
	$ —	$ —	$ 5,148	$ 5,148

During the years ended December 31, 2016, 2017 and 2018, there were no transfers between Level 1, Level 2 and Level 3.

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The Company’s cash equivalents consisted of a money market fund invested in U.S. Treasury securities. The money market fund was valued using inputs observable in active markets for similar securities, which represents a Level 2 measurement in the fair value hierarchy.

Valuation of Preferred Stock Warrant Liability

The preferred stock warrant liability in the table above consists of the fair values of (i) warrants to purchase shares of Series A convertible preferred stock that were issued in 2015 and shares of Series B convertible preferred stock that were issued in 2017 and 2018 in connection with the Company’s Series A and Series B convertible preferred stock financings, respectively (see Notes 7 and 8), (ii) warrants to purchase shares of Series A convertible preferred stock that were issued in 2016 in connection with the Company’s entering into a loan and security agreement with Silicon Valley Bank (see Note 6) and (iii) warrants to purchase shares of Series B convertible preferred stock that were issued or were issuable in 2018 in connection with the Company’s entering into the Hercules Loan Agreement (see Note 6). The liability associated with the warrants was recorded at fair value on the dates the warrants were issued and exercisable and is subsequently remeasured to fair value at each reporting date. The aggregate fair value of the warrant liability was determined based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy.

The Company used various valuation methods, including the Monte Carlo method, the option-pricing method and the hybrid method (which is a combination of an option-pricing method and a probability-weighted expected return method), all of which incorporate assumptions and estimates, to value the preferred stock warrants. Estimates and assumptions impacting the fair value measurement include the fair value per share of the underlying shares of the Company’s Series A and Series B convertible preferred stock, risk free interest rate, expected dividend yield, expected volatility of the price of the underlying preferred stock, and either the remaining contractual term of the warrants (except for warrants that would be automatically exercised upon an initial public offering, in which case the remaining estimated term to automatic exercise was used). The most significant assumption in the Monte Carlo method, the option-pricing method and the hybrid method impacting the fair value of the preferred stock warrants is the fair value of the Company’s convertible preferred stock as of each remeasurement date. The Company determines the fair value per share of the underlying preferred stock by taking into consideration the most recent sales of its convertible preferred stock, results obtained from third-party valuations and additional factors that are deemed relevant. As of December 31, 2016, 2017 and 2018, the fair value of the Series A convertible preferred stock was $1.90 per share, $1.19 per share and $1.70 per share, respectively. As of December 31, 2017 and 2018, the fair value of the Series B convertible preferred stock was $1.84 per share and $1.86 per share, respectively. The Company historically has been a private company and lacks company-specific historical and implied volatility information of its stock. Therefore, it estimates its expected stock volatility based on the historical volatility of publicly traded peer companies for a term equal to the estimated remaining term of the warrants. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve for time periods approximately equal to the estimated remaining term of the warrants. The Company estimated a 0% expected dividend yield based on the fact that the Company has never paid or declared dividends and does not intend to do so in the foreseeable future.

Valuation of Derivative Liability

The fair value of the derivative liability recognized in connection with the Company’s July 2014 license agreement with Genzyme (see Note 12) was determined based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The fair value of this derivative liability

is reported within other liabilities on the consolidated balance sheets. The fair value of this derivative liability was estimated by the Company at each reporting date based, in part, on the results of third-party valuations, which were prepared using the option-pricing method or the hybrid method, each of which considered as inputs the type, timing and probability of occurrence of a change of control event, the potential amount of the payment under potential exit scenarios, the fair value per share of the underlying common stock and the risk-adjusted discount rate. As of December 31, 2017 and 2018, the fair value of this derivative liability was $94 and $183, respectively. The merger with Arsanis (see Notes 1 and 17) qualifies as a change of control event, as defined in the license agreement, but results in no payment being due to Genzyme under the license agreement. As a result, on March 13, 2019, the closing date of the merger with Arsanis, this derivative liability was remeasured to fair value, which was $0, and subsequent changes in fair value will no longer be recognized in the consolidated statements of operations and comprehensive loss because the contingent payment obligation to Genzyme expired at that time.

The fair value of the derivative liability recognized in connection with the Hercules Loan Agreement (see Note 6) was determined based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The fair value of this derivative liability is reported within other liabilities on the consolidated balance sheets. The fair value of this derivative liability was estimated by the Company at each reporting date based, in part, on the results of third-party valuations, which were prepared based on a discounted cash flow model that considered the timing and probability of occurrence of a redemption upon an event of default, the potential amount of prepayment upon an event of default and the risk-adjusted discount rate. As of December 31, 2018, the fair value of this derivative liability was $18.

Valuation of Preferred Stock Repurchase Liability

The fair value of the preferred stock repurchase liability recognized in connection with an October 2017 Series Seed convertible preferred stock repurchase agreement (see Note 7) was determined, in part, based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. In particular, the fair value of the preferred stock repurchase liability was estimated by multiplying (i) the 598,975 shares of Series Seed convertible preferred stock that the Company agreed to repurchase by (ii) the difference between (A) the agreed repurchase price of $1.88 per share and (B) the fair value per share of the Series Seed convertible preferred stock, which result approximated the fair value of the preferred stock repurchase liability given the short duration of the contract. The Company determined the fair value per share of the Series Seed preferred stock by taking into consideration the most recent sales of its convertible preferred stock, results obtained from third-party valuations and additional factors that were deemed relevant. As of December 31, 2017, the fair value of the Series Seed convertible preferred stock was $0.90 per share. In January 2018, the Series Seed preferred stock repurchase agreement was settled (see Note 7).

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The following table provides a roll-forward of the aggregate fair values of the Company's warrant liability, derivative liability and preferred stock repurchase liability, for which fair values are determined using Level 3 inputs:

	Preferred Stock Warrant Liability	Derivative Liability	Preferred Stock Repurchase Liability
Balance as of December 31, 2015	$ 1,762	$ —	$ —
Issuance of warrants to purchase shares of Series A convertible preferred stock	74	—	—
Change in fair value	(48)	—	—
Balance as of December 31, 2016	1,788	—	—
Issuance of warrants to purchase shares of Series B convertible preferred stock	817	—	—
Initial fair value of Series Seed convertible preferred stock subject to repurchase	—	—	587
Changes in fair value	(1,360)	94	—
Balance as of December 31, 2017	1,245	94	587
Issuance of warrants to purchase shares of Series B convertible preferred stock	304	—	—
Repurchase of Series Seed convertible preferred stock in connection with settlement of preferred stock repurchase liability	—	—	(587)
Initial fair value of derivative liability in connection with the Hercules Loan Agreement	—	18	—
Changes in fair value	3,398	89	—
Balance as of December 31, 2018	$ 4,947	$ 201	$ —

4. Property and Equipment, Net

Property and equipment, net consisted of the following:

	December 31, 2017	December 31, 2018
Leasehold improvements	$ 299	$ 299
Furniture and fixtures	53	53
Computer equipment	59	56
Software	28	9
	439	417
Less: Accumulated depreciation and amortization	(95)	(176)
	$ 344	$ 241

Depreciation and amortization expense related to property and equipment was $20, $71, and $103 for the years ended December 31, 2016, 2017 and 2018, respectively.

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As of December 31, 2017 and 2018, the gross amount of assets under capital leases totaled $37 and related accumulated amortization totaled $7 and $19, respectively.

5. Accrued Expenses

Accrued expenses consisted of the following:

	December 31,	
	2017	2018
Accrued employee compensation and benefits	$ 717	$ 924
Accrued external research and development expenses	542	754
Accrued professional fees	185	1,324
Deferred rent, current portion	114	93
Other	62	156
	$1,620	$3,251

6. Long-Term Debt

Long-term debt consisted of the following:

	December 31,	
	2017	2018
Principal amount of long-term debt	$ 6,000	$10,000
Less: Current portion of long-term debt	(1,667)	(1,687)
Long-term debt, net of current portion	4,333	8,313
Unamortized debt discount	—	(226)
Cumulative accretion of final payment due at maturity	48	58
Long-term debt, including accretion, net of discount and current portion	$ 4,381	$ 8,145

SVB Loan Agreement

In October 2016, the Company entered into a loan and security agreement with Silicon Valley Bank ("SVB"), which the Company refers to as the SVB Loan Agreement, pursuant to which SVB made certain term loans available to the Company. The SVB Loan Agreement provided for aggregate maximum borrowings of up to $10,000, consisting of: (i) subject to specified conditions, a term loan of up to $6,000 (the "Term A Loan"), which was borrowed by the Company in June 2017, and (ii) subject to specified conditions, an additional term loan of up to $4,000 (the "Term B Loan") available for borrowing until December 31, 2017. As of December 31, 2017, the Company had not borrowed any amounts under the Term B Loan and the availability of the additional $4,000 expired.

Borrowings under the SVB Loan Agreement bore interest at a variable rate equal to 5.5% plus the greater of (i) 3.5% or (ii) *The Wall Street Journal* prime rate; provided, however, that in an event of default, as defined, the interest rate applicable to borrowings under the SVB Loan Agreement would be increased by 5.0%. As of December 31, 2017 and October 19, 2018, the date of repayment of all borrowings under the SVB Loan

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Agreement, the interest rate applicable to borrowings under the SVB Loan Agreement was 10.0% and 10.75%, respectively. In addition, the SVB Loan Agreement provided for a final payment, payable upon maturity or the repayment in full of all obligations under agreement, equal to 4.5% of the total amount borrowed, or $270. The final payment was being accreted to interest expense to increase the carrying value of the debt over the term of the loan using the effective interest method.

During the year ended December 31, 2016, the Company paid SVB $89 for facility fees and legal costs associated with entering into the SVB Loan Agreement. These costs were recorded as debt issuance costs within prepaid expenses and other current assets as of December 31, 2016 and were fully recognized as non-cash interest expense using the effective interest method over the term that the Term A Loan and Term B Loan were available to be drawn, which expired on June 30, 2017 and December 31, 2017, respectively.

Borrowings under the SVB Loan Agreement were repayable in monthly interest-only payments through December 2017 and in equal monthly payments of principal and accrued interest from January 2018 until the maturity date of the SVB Loan Agreement in December 2020. At its option, the Company was entitled to prepay all, but not less than all, of the outstanding borrowings, subject to a prepayment premium of up to 3% of the principal amount outstanding as of the date of repayment.

Borrowings under the SVB Loan Agreement were collateralized by substantially all of the Company's personal property, excluding intellectual property. Under the SVB Loan Agreement, the Company agreed to affirmative and negative covenants to which it would remain subject until maturity or repayment in full. The negative covenants included restrictions on the Company's ability to incur additional indebtedness, pay dividends, encumber its intellectual property, or engage in certain fundamental business transactions, such as mergers or acquisitions of other businesses. The obligations under the SVB Loan Agreement were subject to acceleration upon occurrence of specified events of default, including payment default, insolvency and a material adverse change in the Company's business, operations or financial or other condition.

In connection with entering into the SVB Loan Agreement, in October 2016, the Company issued to the lenders warrants for the purchase of 54,256 shares of Series A convertible preferred stock at an exercise price of $1.88 per share, which warrants had an aggregate initial fair value of $74 (see Note 8). The warrants were immediately exercisable and expire in October 2026. On the issuance date of the warrants, the Company recorded the issuance-date fair value of the warrants of $74 as a preferred stock warrant liability, with a corresponding amount recorded as debt issuance costs within prepaid expenses and other current assets as the warrants were issued prior to any amounts being drawn under the SVB Loan Agreement. The $74 was recognized as non-cash interest expense using the effective interest method over the period that the Term A Loan was available for borrowing through June 30, 2017. Together with the amortization of the facility fees and legal costs of $89 and the accretion of the final payment of $270, total non-cash interest expense recognized during the years ended December 31, 2016, 2017 and 2018 was $53, $157 and $80, respectively. Through the date of repayment of all borrowings under the SVB Loan Agreement, the debt discount related to the warrants was reflected as a reduction of the carrying value of the long-term debt on the Company's consolidated balance sheet and was being accreted to interest expense over the term of the loan using the effective interest method.

The Company recognized aggregate interest expense under the SVB Loan Agreement of $53, $487 and $484 for the years ended December 31, 2016, 2017 and 2018, respectively, which included the non-cash interest expense described above. The Company's annual effective interest rate of the SVB Loan Agreement was approximately 12.0% and 11.8% for the year ended December 31, 2017 and the period from January 1, 2018 through the date of repayment of all borrowings under the SVB Loan Agreement, respectively.

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There were no principal payments due or paid under the SVB Loan Agreement during the years ended December 31, 2016 or 2017. During the year ended December 31, 2018, the Company made aggregate scheduled principal payments of $1,667.

In October 2018, in connection with entering into the Hercules Loan Agreement, the Company terminated the SVB Loan Agreement and repaid all amounts due under the SVB Loan Agreement, including unpaid principal of $4,333, a final payment of $270, a prepayment premium of $87 and accrued interest of $23. The Company accounted for the repayment of amounts as an extinguishment of the SVB Loan Agreement and recognized a loss on extinguishment of debt of $229 within other income (expense), net in the consolidated statement of operations and comprehensive loss. The loss on extinguishment of debt was calculated as the difference between the reacquisition price of the borrowings under the SVB Loan Agreement of $4,713 and the carrying value of the debt under the SVB Loan Agreement of $4,484.

Hercules Loan Agreement

In October 2018, the Company entered into the Hercules Loan Agreement, which provided for aggregate borrowings of up to $13,000, consisting of (i) a term loan of up to $8,000, which was available upon entering into the agreement, (ii) subject to specified financing conditions, an additional term loan of up to $2,000, available for borrowing from January 1, 2019 to March 31, 2019, and (iii) subject to specified financing conditions and the receipt of the second tranche $2,000 term loan described above, an additional term loan of up to $3,000, available for borrowing until March 31, 2019. In October 2018, the Company borrowed $8,000 under the Hercules Loan Agreement.

In December 2018, the Company entered into the First Amendment to the Hercules Loan Agreement (the “First Amendment”), which amended the available borrowing dates of the second tranche from between January 1, 2019 and March 31, 2019 to between December 11, 2018 and December 14, 2018 and amended the term loan maturity date to November 1, 2021. In December 2018, the Company borrowed the additional $2,000 provided under the Hercules Loan Agreement, as amended by the First Amendment.

In March 2019, the conditions necessary for borrowing the remaining $3,000 under the Hercules Loan Agreement were not met and the borrowing capacity expired at that time.

Borrowings under the Hercules Loan Agreement bear interest at variable rates, with the first tranche bearing interest at a variable rate equal to the greater of (i) 9.5% or (ii) 9.5% plus *The Wall Street Journal* prime rate minus 5.25%, the second tranche bearing interest at a variable rate, subject to completion of specified financing conditions, equal to either (A) the greater of (i) 9.5% or (ii) 9.5% plus *The Wall Street Journal* prime rate minus 5.25% or (B) the greater of (i) 8.75% or (ii) 8.75% plus *The Wall Street Journal* prime rate minus 5.25%, and the third tranche bearing interest at a variable rate equal to the greater of (i) 8.75% or (ii) 8.75% plus *The Wall Street Journal* prime rate minus 5.25%. In an event of default, as defined, and until such event is no longer continuing, the interest rate applicable to borrowings under the Hercules Loan Agreement would be increased by 4.0%. As of December 31, 2018, the interest rate applicable to borrowings under the Hercules Loan Agreement was 9.75%.

Borrowings under the Hercules Loan Agreement are repayable in monthly interest-only payments through August 2019, or a later date upon achievement of specified conditions, and in equal monthly payments of principal and accrued interest from September 2019 until the maturity date of the loan, which is either, (i) if the second tranche is not borrowed, November 2021 or, (ii) if the second tranche is borrowed, May 2022. At the

Company's option, the Company may prepay all, but not less than all, of the outstanding borrowings, subject to a prepayment premium of up to 2.0% of the principal amount outstanding as of the date of repayment. The Hercules Loan Agreement also provides for a final payment, payable upon maturity or the repayment in full of all obligations under the agreement, of up to $953. An aggregate final payment of $794 payable in connection with the $8,000 term loan and the $2,000 term loan is being accreted to interest expense to increase the carrying value of the debt over the term of the loan using the effective interest method.

In addition, the Hercules Loan Agreement contains a redemption feature that, upon an event of default, provides Hercules the option to accelerate and demand repayment of the debt, including a prepayment premium. The Company concluded that the redemption feature meets the definition of a derivative instrument as the repayment of the debt contains a substantial premium, resulting in the redemption feature not being clearly and closely related to the host instrument. The Company recorded the issuance-date fair value of the derivative liability of $18 as a debt discount and as a derivative liability on its consolidated balance sheet.

Borrowings under the Hercules Loan Agreement are collateralized by substantially all of the Company's personal property and other assets, including its intellectual property until a specified financing condition is met. Under the Hercules Loan Agreement, the Company has agreed to affirmative and negative covenants to which the Company will remain subject until maturity or repayment in full. The covenants include maintaining a minimum liquidity amount of the lesser of (i) 125% of outstanding borrowings under the Hercules Loan Agreement and (ii) 100% of the Company's cash and cash equivalents in an account in which Hercules has a first priority security interest as well as restrictions on the Company's ability to incur additional indebtedness, pay dividends, encumber its intellectual property, or engage in certain fundamental business transactions, such as mergers or acquisitions of other businesses. Obligations under the Hercules Loan Agreement are subject to acceleration upon occurrence of specified events of default, including payment default, insolvency and a material adverse change in the Company's business, operations or financial or other condition.

In connection with entering into the Hercules Loan Agreement in October 2018, the Company issued to Hercules warrants for the purchase of 210,638 shares of Series B convertible preferred stock at an exercise price of $1.88 per share. These warrants were immediately exercisable and expire in October 2028.

In connection with entering into the First Amendment in December 2018, the Company agreed to issue to Hercules warrants for the purchase of a specified number of shares of convertible preferred stock or, if issued following the merger with Arsanis, a specified number of shares of common stock of the combined organization, at an aggregate exercise price of $99. The warrants were to be issued at the earliest of (i) June 30, 2019, (ii) the earlier to occur of (a) the date the Company prepays the outstanding borrowings or (b) the date the outstanding borrowings become due and payable, or (iii) on or before the fifth business day following the closing of or the announcement of the termination of the Company's merger with Arsanis. The number of shares of convertible preferred stock issuable upon exercise of these warrants was determined to be 52,659 shares, calculated by dividing $99 by the $1.88 price per share paid by investors that purchased shares of Series B convertible preferred stock in September 2018 (see Note 7). These warrants will be exercisable for a period of ten years from the date of issuance. As of December 31, 2018, the warrants had not yet been issued. On March 18, 2019, as a result of the closing of the merger with Arsanis on March 13, 2019, the Company issued to Hercules warrants for the purchase of 5,000 shares of common stock of the combined organization at an exercise price of $19.80 per share, each of which reflected the share Exchange Ratio of 1-for-0.5702 applied in the merger as well as the 6-for-1 reverse stock split effected by the combined organization on March 13, 2019 (see Note 17).

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On October 19, 2018 and December 11, 2018, the dates the Company entered into the Hercules Loan Agreement and the First Amendment, respectively, the Company recorded the aggregate initial fair value of the warrants of $132 as a preferred stock warrant liability, with a corresponding amount recorded as a debt discount on the Company's consolidated balance sheet.

In connection with entering into the Hercules Loan Agreement and the First Amendment, the Company also paid Hercules $92 of upfront fees, including facility, due diligence and legal fees associated with entering into the agreement, which were also recorded as a debt discount. The debt discount is reflected as a reduction of the carrying value of long-term debt on the Company's consolidated balance sheet and is being amortized to interest expense over the term of the loan using the effective interest method.

The Company recognized aggregate interest expense under the Hercules Loan Agreement of $236 during the year ended December 31, 2018, which included non-cash interest expense of $72 related to the accretion of the debt discount and the final payment. As of December 31, 2018, the unamortized debt discount was $226. The Company's annual effective interest rate of the Hercules Loan Agreement was approximately 14.2% for the period from October 19, 2018 to December 31, 2018.

There were no principal payments due or paid under the Hercules Loan Agreement during the year ended December 31, 2018.

As of December 31, 2018, future principal payments and the final payment due under the Hercules Loan Agreement were as follows:

Year Ending December 31,	
2019	$ 1,687
2020	4,340
2021	4,767
	$10,794

7. Convertible Preferred Stock

The Company has issued Series Seed convertible preferred stock (the "Series Seed preferred stock"), Series A convertible preferred stock (the "Series A preferred stock") and Series B convertible preferred stock (the "Series B preferred stock"). The Series Seed preferred stock, Series A preferred stock and Series B preferred stock are collectively referred to as the "Preferred Stock". As of December 31, 2017 and 2018, the Company's certificate of incorporation, as amended and restated, authorized the Company to issue a total of 54,313,523 shares and 59,413,523 shares, respectively, of Preferred Stock, with a par value of $0.001 per share. As of December 31, 2017 and 2018, 10,000,000 shares of Preferred Stock remained undesignated.

The holders of Preferred Stock have liquidation rights in the event of a deemed liquidation that, in certain situations, are not solely within the control of the Company. Therefore, the Preferred Stock is classified outside of stockholders' deficit on the consolidated balance sheet.

In January 2015, the Company issued and sold 2,115,111 shares of Series Seed preferred stock, consisting of (i) 1,162,128 shares sold at a price of $0.882 per share for proceeds of $986, net of issuance costs of $39, and (ii) 952,983 shares issued upon the conversion of $841 of principal and interest accrued on a convertible promissory note.

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In August 2015, the Company issued and sold 19,946,862 shares of Series A preferred stock at a price of $1.88 per share for proceeds of $34,242, net of issuance costs of $3,258, including a fee paid to the placement agent of $2,984. In connection with the Series A preferred stock issuance, the Company also issued to the placement agent warrants for the purchase of an aggregate of 1,587,238 shares of Series A preferred stock (See Note 8). The initial carrying value of the Series A preferred stock was recorded at $32,480, equal to $37,500 of gross proceeds received by the Company, reduced by the issuance costs of $3,258 and the $1,762 aggregate fair value of the warrants to purchase shares of Series A preferred stock (see Note 8).

In October 2017, the Company entered into a stock repurchase agreement with a holder of Series Seed preferred stock for the repurchase of 598,975 shares of Series Seed preferred stock at a price of $1.88 per share, which was contingent upon the closing of a Series B preferred stock financing by the Company and obtaining SVB's written consent to the repurchase. Upon entering into the repurchase agreement, the Company concluded that the arrangement was a freestanding financial instrument that was required to be recorded as a liability at fair value. In connection with this agreement, the Company recorded a preferred stock repurchase liability of $587 for the fair value of the financial instrument on the consolidated balance sheet and a corresponding expense in the consolidated statement of operations and comprehensive loss. The fair value of the repurchase liability was estimated by multiplying (i) the 598,975 shares of Series Seed preferred stock that the Company agreed to repurchase by (ii) the difference between (A) the agreed repurchase price of $1.88 per share and (B) the fair value per share of the Series Seed preferred stock of $0.90 per share at the date of the agreement, which approximated the fair value of the preferred stock repurchase liability given the short duration of the contract. In January 2018, the Company settled the transaction and repurchased the 598,975 shares of Series Seed preferred stock for a cash payment of $1,126. The changes in the fair value of the preferred stock repurchase liability from October 2017 to December 31, 2017 and through the settlement date of the repurchase agreement in January 2018 were immaterial. In January 2018, the $22 aggregate difference between the estimated fair value and the carrying value of the Series Seed preferred stock that was repurchased was recorded as in increase to accumulated deficit upon settlement of the repurchase agreement.

In November and December 2017, the Company issued and sold 15,956,995 shares of Series B preferred stock at a price of $1.88 per share for proceeds of $27,413, net of issuance costs of $2,586, including a fee paid to the placement agent of $2,353. In connection with the Series B preferred stock issuance, the Company (i) issued to the purchasers of the Series B preferred stock warrants for the purchase of an aggregate of 1,595,731 shares of Series B preferred stock and (ii) issued to the placement agent a warrant for the purchase of 1,219,815 shares of Series B preferred stock (see Note 8). The initial carrying value of the Series B preferred stock was recorded at $26,596, equal to $29,999 of gross proceeds received by the Company, reduced by issuance costs of $2,586 and the $817 aggregate fair value of the warrants to purchase shares of Series B preferred stock.

In September 2018, the Company issued and sold 2,659,574 shares of Series B preferred stock at a price of $1.88 per share for proceeds of $4,461, net of issuance costs of $539, including a fee paid to the placement agent of $432. In connection with the Series B preferred stock issuance, the Company issued to the placement agent a warrant for the purchase of 478,722 shares of Series B preferred stock (see Note 8). The initial carrying value of the Series B preferred stock was recorded at $4,289, equal to $5,000 of gross proceeds received by the Company, reduced by the issuance costs of $539 and the $172 aggregate fair value of the warrants to purchase shares of Series B preferred stock.

Upon issuance of each class of Preferred Stock, the Company assessed the embedded conversion and liquidation features of the securities and determined that such features did not require the Company to separately

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account for these features. The Company also concluded that no beneficial conversion feature existed on the issuance date of each class of Preferred Stock.

As of each balance sheet date, the Preferred Stock consisted of the following:

	December 31, 2017				
	Preferred Stock Designated	Preferred Stock Issued and Outstanding	Carrying Value	Liquidation Preference	Common Stock Issuable Upon Conversion
Series Seed preferred stock	2,313,523	2,115,111	$ 1,827	$ 2,014	2,115,111
Series A preferred stock	22,000,000	19,946,862	32,480	44,624	19,946,862
Series B preferred stock	20,000,000	15,956,995	26,596	29,999	15,956,995
	44,313,523	38,018,968	$ 60,903	$ 76,637	38,018,968

	December 31, 2018				
	Preferred Stock Designated	Preferred Stock Issued and Outstanding	Carrying Value	Liquidation Preference	Common Stock Issuable Upon Conversion
Series Seed preferred stock	2,313,523	1,516,136	$ 1,310	$ 1,444	1,516,136
Series A preferred stock	22,000,000	19,946,862	32,480	47,624	19,946,862
Series B preferred stock	25,100,000	18,616,569	30,885	34,999	18,616,569
	49,413,523	40,079,567	$ 64,675	$ 84,067	40,079,567

The holders of the Preferred Stock have the following rights and preferences:

Voting

The holders of Preferred Stock are entitled to vote, together with the holders of common stock as a single class, on all matters submitted to stockholders for a vote and have the right to vote the number of shares equal to the number of shares of common stock into which each share of Preferred Stock could convert on the record date for determination of stockholders entitled to vote.

The holders of Series Seed preferred stock, voting exclusively and as a separate class, are entitled to elect one director of the Company, and the holders of Series A and Series B preferred stock, voting together as a single class, are entitled to elect one director of the Company.

Conversion

Each share of Preferred Stock is convertible, at the option of the holder, at any time after the date of issuance. In addition, each share of Preferred Stock will be automatically converted into shares of common stock at the applicable conversion ratio then in effect (i) upon the closing of a firm-commitment public offering resulting in at least $50,000 of gross proceeds to the Company at a price of at least $9.40 per share of common stock, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization, or (ii) upon the written consent of the holders of a majority of the then-outstanding shares of Preferred Stock, voting together as a single class.

The conversion ratio of each series of Preferred Stock is determined by dividing the Original Issue Price of each series by the Conversion Price of each series. The Original Issue Price per share is $0.882 for Series Seed preferred stock (the "Series Seed Original Issue Price"), $1.88 for Series A preferred stock (the "Series A Original Issue Price") and $1.88 for Series B preferred stock (the "Series B Original Issue Price"), each subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization and other adjustments as set forth in the Company's certificate of incorporation, as amended and restated. The Conversion Price per share is $0.882 for Series Seed preferred stock, $1.88 for Series A preferred stock and $1.88 for Series B preferred stock, each subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization and other adjustments as set forth in the Company's certificate of incorporation, as amended and restated. Accordingly, as of December 31, 2017 and 2018, each share of each series of Preferred Stock was convertible into shares of common stock on a one-for-one basis.

Dividends

The holders of Series Seed preferred stock are entitled to receive noncumulative dividends when, as and if declared by the board of directors. Dividends accrue on Series Seed preferred stock at a rate of 8%; however, such dividends are only payable when, as and if declared by the board of directors or in the case of a liquidation, dissolution, or winding up of the Company or Deemed Liquidation Event (as defined below).

The holders of Series A preferred stock are entitled to receive cumulative dividends when, as and if declared by the board of directors. Dividends accrue on Series A preferred stock at a rate of 8%; however, such dividends are only payable when, as and if declared by the board of directors or in the case of a liquidation, dissolution, or winding up of the Company or Deemed Liquidation Event (as defined below). Such dividends have not been accreted to the carrying value of the Series A preferred stock as a liquidation event is not yet probable and the holders of the Series A preferred stock have no redemption rights. Additionally, for the computation of net loss per share attributable to common stockholders (see Note 14), accruing undeclared dividends on Series A preferred stock increased the net loss attributable to common stockholders for the years ended December 31, 2016, 2017 and 2018 by $3,008, $3,000 and $3,000, respectively.

The holders of Series B preferred stock are entitled to receive noncumulative dividends only when, as and if declared by the board of directors.

The Company may not (i) declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Company, other than dividends on shares of common stock payable in shares of common stock, unless the holders of the Series A preferred stock then outstanding shall first receive, or simultaneously receive, a dividend on each outstanding share of Series A preferred stock in an amount at least equal to (A) in the case of a dividend on common stock or any class or series that is convertible into common stock, that dividend per share of Series A preferred stock as would equal the product of (1) the dividend payable on each share of such class or series determined as if all shares of such class or series had been converted into common stock and (2) the number of shares of common stock issuable upon conversion of a share of Series A preferred stock, in each case calculated on the record date for determination of holders entitled to receive such dividend, or (B) in the case of a dividend on any class or series that is not convertible into common stock, at a rate per share of Series A preferred stock determined by (1) dividing the amount of the dividend payable on each share of such class or series of capital stock by the Original Issue Price of such class or series of capital stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar

recapitalization with respect to such class or series) and (2) multiplying such fraction by an amount equal to the Series A Original Issue Price, and (ii) declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Company (other than dividends on shares of (A) Series A preferred stock or (B) common stock payable in shares of common stock) unless the holders of the Series Seed preferred stock then outstanding shall first receive, or simultaneously receive, a dividend on each outstanding share of Series Seed preferred stock in an amount at least equal to (A) in the case of a dividend on common stock or any class or series that is convertible into common stock, that dividend per share of Series Seed preferred stock as would equal the product of (1) the dividend payable on each share of such class or series determined as if all shares of such class or series had been converted into common stock and (2) the number of shares of common stock issuable upon conversion of a share of Series Seed preferred stock, in each case calculated on the record date for determination of holders entitled to receive such dividend or (B) in the case of a dividend on any class or series that is not convertible into common stock, at a rate per share of Series Seed preferred stock determined by (1) dividing the amount of the dividend payable on each share of such class or series of capital stock by the Original Issue Price of such class or series of capital stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to such class or series) and (2) multiplying such fraction by an amount equal to the Series Seed Original Issue Price provided that, if the Company declares, pays or sets aside, on the same date, a dividend on shares of more than one class or series of capital stock, the dividend payable to the holders of Preferred Stock shall be calculated based upon the dividend on the class or series of capital stock that would result (x) in the case of the Series Seed preferred stock, in the highest Series Seed preferred stock dividend and (y) in the case of the Series A preferred stock, in the highest Series A preferred stock dividend.

Through December 31, 2017 and 2018, no cash dividends have been declared or paid.

Liquidation

In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Company or Deemed Liquidation Event (as defined below), each holder of the then-outstanding Series B preferred stock will be entitled to receive an amount equal to the greater of (i) the Series B Original Issue Price plus any dividends declared but unpaid thereon or (ii) the amount such holder would have received if such holder had converted its shares into common stock immediately prior to such liquidation event. In the event that the assets available for distribution to stockholders are insufficient to pay the holders of Series B preferred stock the full amounts to which they are entitled, the assets available for distribution will be distributed on a pro rata basis among the holders of the Series B preferred stock in proportion to the respective amounts that would otherwise be payable in respect of such shares.

After the payment of all preferential amounts to the holders of Series B preferred stock, each holder of the then-outstanding Series A preferred stock will be entitled to receive an amount equal to the greater of (i) the Series A Original Issue Price plus any accrued dividends and any other dividends declared but unpaid thereon or (ii) the amount such holder would have received if such holder had converted its shares into common stock immediately prior to such liquidation event. In the event that the assets available for distribution to stockholders are insufficient to pay the holders of Series A preferred stock the full amounts to which they are entitled, the assets available for distribution will be distributed on a pro rata basis among the holders of the Series A preferred stock in proportion to the respective amounts that would otherwise be payable in respect of such shares.

After the payment of all preferential amounts to the holders of Series B and Series A preferred stock, each holder of the then-outstanding Series Seed preferred stock will be entitled to receive an amount equal to the

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Series Seed Original Issue Price plus any accrued dividends and any other dividends declared but unpaid thereon. In the event that the assets available for distribution to stockholders are insufficient to pay the holders of Series Seed preferred stock the full amounts to which they are entitled, the assets available for distribution will be distributed on a pro rata basis among the holders of the Series Seed preferred stock in proportion to the respective amounts that would otherwise be payable in respect of such shares.

After the payment of all preferential amounts to the holders of Preferred Stock, then, to the extent available, the remaining assets of the Company will be distributed among the holders of Series Seed preferred stock and common stock, pro rata based on the number of shares held by each such holder, treating all such securities as if they had been converted to common stock immediately prior to such liquidation event.

Unless the holders of a majority of the then-outstanding Preferred Stock, voting together as a single class, elect otherwise, a Deemed Liquidation Event shall include a merger or consolidation (other than one in which stockholders of the Company own a majority by voting power of the outstanding shares of the surviving or acquiring corporation) or a sale, lease, transfer, exclusive license or other disposition of all or substantially all of the assets of the Company.

The Company's merger with Arsanis (see Note 1) did not qualify as an initial public offering or a Deemed Liquidation Event under the terms of the Preferred Stock. Pursuant to the terms of the Merger Agreement, upon closing of the merger on March 13, 2019, all of the Company's outstanding convertible preferred stock was exchanged for common stock of Arsanis.

Redemption

The Company's certificate of incorporation, as amended and restated, does not provide redemption rights to the holders of Preferred Stock.

8. Preferred Stock Warrants

As of each balance sheet date, the Company's outstanding warrants to purchase shares of convertible preferred stock consisted of the following:

		December 31, 2017				
Warrant Name	**Issuance Date**	**Number of Shares of Preferred Stock Issuable**	**Exercise Price**	**Exercisable for**	**Classification**	**Expiration Date**
Series A warrants	August 14, 2015	854,785	$2.07	Series A	Liability	August 14, 2020
Series A warrants	August 21, 2015	732,453	$2.07	Series A	Liability	August 21, 2020
SVB warrants	October 25, 2016	54,256	$1.88	Series A	Liability	October 24, 2026
Series B warrants	November 1, 2017	1,374,435	$1.88	Series B	Liability	October 31, 2020
Series B warrants	November 17, 2017	88,845	$1.88	Series B	Liability	November 16, 2020
Series B warrants	December 4, 2017	59,576	$1.88	Series B	Liability	December 3, 2020
Series B warrants	December 28, 2017	72,875	$1.88	Series B	Liability	December 27, 2020
Series B warrants	December 28, 2017	1,219,815	$1.88	Series B	Liability	December 28, 2027
		4,457,040				

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	December 31, 2018					
Warrant Name	**Issuance Date**	**Number of Shares of Preferred Stock Issuable**	**Exercise Price**	**Exercisable for**	**Classification**	**Expiration Date**
Series A warrants	August 14, 2015	854,785	$ 2.07	Series A	Liability	August 14, 2020
Series A warrants	August 21, 2015	732,453	$ 2.07	Series A	Liability	August 21, 2020
SVB warrants	October 25, 2016	54,256	$ 1.88	Series A	Liability	October 24, 2026
Series B warrants	November 1, 2017	1,374,435	$ 1.88	Series B	Liability	October 31, 2020
Series B warrants	November 17, 2017	88,845	$ 1.88	Series B	Liability	November 16, 2020
Series B warrants	December 4, 2017	59,576	$ 1.88	Series B	Liability	December 3, 2020
Series B warrants	December 28, 2017	72,875	$ 1.88	Series B	Liability	December 27, 2020
Series B warrants	December 28, 2017	1,219,815	$ 1.88	Series B	Liability	December 28, 2027
Series B warrants	September 12, 2018	265,957	$ 1.88	Series B	Liability	September 12, 2021
Series B warrants	September 12, 2018	212,765	$ 1.88	Series B	Liability	September 12, 2028
Hercules warrants	October 19, 2018	210,638	$ 1.88	Series B	Liability	October 19, 2028
		5,146,400				

The Company classifies all of its preferred stock warrants as a liability on its consolidated balance sheet because the warrants are freestanding financial instruments that may require the Company to transfer assets upon exercise. The liability associated with each of these warrants was initially recorded at fair value upon the issuance date of each warrant and is subsequently remeasured to fair value at each reporting date. Changes in the fair value of the warrant liability are recognized as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss. Changes in the fair value of each warrant comprising the preferred stock warrant liability will continue to be recognized until each respective warrant is exercised, expires or qualifies for equity classification.

Series A Preferred Stock Warrants

In connection with the issuance of Series A preferred stock in August 2015 (see Note 7), the Company issued warrants for the purchase of an aggregate of 1,587,238 shares of Series A preferred stock (the “Series A warrants”) at an exercise price of $2.07 per share. The warrants were immediately exercisable and expire in August 2020.

The issuance-date fair value of the Series A warrants of $1,762 was recorded as a warrant liability and as a corresponding reduction in the carrying value of the Series A preferred stock. The Company remeasured the liability associated with the Series A warrants as of December 31, 2016, 2017 and 2018 and determined that the fair value of the warrant liability was $1,714, $412 and $1,127, respectively (see Note 3). The Company recognized gains (losses) of $48, $1,302 and $(715) within other income (expense), net in the consolidated statements of operations and comprehensive loss for the years ended December 31, 2016, 2017 and 2018, respectively, related to the change in fair value of the Series A warrants.

SVB Preferred Stock Warrants

In connection with the SVB Loan Agreement (see Note 6), in October 2016, the Company issued to the lenders warrants for the purchase of 54,256 shares of Series A preferred stock (the “SVB warrants”) at an exercise price of $1.88 per share. The warrants were immediately exercisable and expire in October 2026.

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The issuance-date fair value of the SVB warrants of $74 was recorded as a warrant liability and as a corresponding reduction in the carrying value of long-term debt. The Company remeasured the liability associated with the SVB warrants as of December 31, 2016, 2017 and 2018 and determined that the fair value of the warrant liability was $74, $16 and $69, respectively. The Company recognized gains (losses) of $0, $58 and $(53) within other income (expense), net in the consolidated statements of operations and comprehensive loss for the years ended December 31, 2016, 2017 and 2018, respectively, related to the change in fair value of the SVB warrants.

Series B Preferred Stock Warrants

In connection with the issuance of Series B preferred stock in November and December 2017 and September 2018 (see Note 7), the Company issued warrants for the purchase of an aggregate of 3,294,268 shares of Series B preferred stock (the “Series B warrants”) at an exercise price of $1.88 per share. The warrants were immediately exercisable. Warrants for the purchase of an aggregate of 1,595,731 shares of Series B preferred stock expire in October, November and December 2020, a warrant for the purchase of 265,957 shares of Series B preferred stock expires in September 2021, a warrant for the purchase of 1,219,815 shares of Series B preferred stock expires in December 2027 and a warrant for the purchase of 212,765 shares of Series B preferred stock expires in September 2028.

The issuance-date fair value of the Series B warrants issued in November and December 2017 was $817, which was recorded as a warrant liability and as a corresponding reduction in the carrying value of the Series B preferred stock. The Company remeasured the liability associated with the Series B warrants issued in November and December 2017 as of December 31, 2017 and 2018 and determined that the fair value of the warrant liability was $817 and $2,871, respectively. The Company recognized gains (losses) of $0 and $(2,054) within other income (expense), net in the consolidated statements of operations and comprehensive loss for the years ended December 31, 2017 and 2018, respectively, related to the change in fair value of the Series B warrants issued in November and December 2017.

The issuance-date fair value of the Series B warrants issued in September 2018 was $172, which was recorded as a warrant liability and as a corresponding reduction in the carrying value of the Series B preferred stock. The Company remeasured the liability associated with the Series B warrants issued in September 2018 as of December 31, 2018 and determined that the fair value of the warrant liability was $527. The Company recognized a loss of $355 within other income (expense), net in the consolidated statement of operations and comprehensive loss for the year ended December 31, 2018 related to the change in fair value of the Series B warrant issued in September 2018.

Hercules Preferred Stock Warrants

In connection with entering into the Hercules Loan Agreement in October 2018, the Company issued to Hercules warrants for the purchase of 210,638 shares of Series B preferred stock at an exercise price of $1.88 per share. These warrants were immediately exercisable and expire in October 2028.

In connection with entering into the First Amendment in December 2018, the Company agreed to issue to Hercules warrants for the purchase of a specified number of shares of convertible preferred stock or, if issued following the merger with Arsanis, a specified number of shares of common stock of the combined organization (together with the warrants issued in October 2018 in connection with the Hercules Loan Agreement, the

"Hercules warrants"), at an aggregate exercise price of $99. The warrants were to be issued at the earliest of (i) June 30, 2019, (ii) the earlier to occur of (a) the date the Company prepays the outstanding borrowings or (b) the date the outstanding borrowings become due and payable, or (iii) on or before the fifth business day following the closing of or the announcement of the termination of the Company's merger with Arsanis. The number of shares of convertible preferred stock issuable upon exercise of these warrants was determined to be 52,659 shares, calculated by dividing $99 by the $1.88 price per share paid by investors that purchased shares of Series B convertible preferred stock in September 2018 (see Note 7). These warrants will be exercisable for a period of ten years from the date of issuance. As of December 31, 2018, the warrants had not yet been issued. On March 18, 2019, as a result of the closing of the merger with Arsanis on March 13, 2019, the Company issued to Hercules warrants for the purchase of 5,000 shares of common stock of the combined organization at an exercise price of $19.80 per share, each of which reflected the share Exchange Ratio of 1-for-0.5702 applied in the merger as well as the 6-for-1 reverse stock split effected by the combined organization on March 13, 2019 (see Note 17).

The aggregate initial fair value of the Hercules warrants of $132 was recorded as a warrant liability and as a corresponding reduction in the carrying value of long-term debt. The Company remeasured the liability associated with the Hercules warrants as of December 31, 2018 and determined that the fair value of the warrant liability was $353. The Company recognized a loss of $221 within other income (expense), net in the consolidated statements of operations and comprehensive loss for the year ended December 31, 2018 related to the change in fair value of the Hercules warrants.

Automatic Exercise of Preferred Stock Warrants

All of the Company's outstanding preferred stock warrants, other than the SVB warrants and Hercules warrants, contain a feature whereby the warrants will be automatically exercised and net settled in shares upon an initial public offering or a Deemed Liquidation Event. Upon either of those events, the holders of the preferred stock warrants will be issued a number of shares of the Company equal in value to the difference between the fair value of the shares into which each warrant is exercisable and the exercise price of such warrant. The Company's merger with Arsanis (see Note 1) did not qualify as an initial public offering or a Deemed Liquidation Event under the terms of the warrants.

Exchange of Preferred Stock Warrants in Connection with Merger

Upon the closing of the merger with Arsanis on March 13, 2019 (see Note 1), pursuant to the Merger Agreement, all of the outstanding preferred stock warrants became exercisable for common stock of Arsanis instead of preferred stock. Accordingly, the fair value of the warrant liability for these warrants was remeasured (with changes in fair value recognized in the consolidated statement of operations) and the amount of the warrant liability was reclassified to additional paid-in capital upon the closing of the merger with Arsanis.

9. Redeemable Common Stock

Pursuant to the requirements of the July 2014 license agreement with Genzyme (see Note 12), in August 2015, the Company issued to Genzyme for no additional consideration 1,129,823 shares of common stock, which had an aggregate fair value of $734 on the date of issuance. Genzyme has the right to require the Company to repurchase all, but not less than all, of these shares of common stock at any time during the term of the license agreement for a price of $0.01 per share. Because of this redemption feature, the shares of common stock issued to Genzyme are classified outside of stockholders' deficit on the consolidated balance sheets.

10. Common Stock

As of December 31, 2017 and 2018, the Company's certificate of incorporation, as amended and restated, authorized the Company to issue 110,000,000 shares and 116,500,000 shares, respectively, of $0.001 par value common stock. The voting, dividend and liquidation rights of the holders of the Company's common stock are subject to and qualified by the rights, powers and preferences of the holders of the Preferred Stock set forth above.

Each share of common stock entitles the holder to one vote on all matters submitted to a vote of the Company's stockholders. The holders of common stock, voting exclusively and as a separate class, are entitled to elect one director of the Company. Common stockholders are entitled to receive dividends, as may be declared by the board of directors, if any, subject to the preferential dividend rights of Preferred Stock. Through December 31, 2017 and 2018, no cash dividends had been declared or paid.

11. Stock-Based Compensation

2015 Employee, Director and Consultant Equity Incentive Plan

The Company's 2015 Employee, Director and Consultant Equity Incentive Plan, as amended (the "2015 Plan"), provides for the Company to grant incentive stock options or nonqualified stock options, restricted stock awards and other stock-based awards to employees, directors and consultants of the Company.

The total number of shares of common stock that may be issued under the 2015 Plan was 9,000,000 shares as of December 31, 2017. During the year ended December 31, 2018, the Company increased the number of shares of common stock reserved for issuance under the 2015 Plan to 10,200,000 shares. As of December 31, 2017 and 2018, 3,889,724 shares and 1,673,089 shares, respectively, remained available for future grant under the 2015 Plan. Shares that are expired, forfeited, canceled or otherwise terminated without having been fully exercised will be available for future grant under the 2015 Plan. In addition, shares of common stock that are tendered to the Company by a participant to exercise an award are added to the number of shares of common stock available for future grants.

The 2015 Plan is administered by the board of directors or, at the discretion of the board of directors, by a committee of the board of directors. The exercise prices, vesting and other restrictions are determined at the discretion of the board of directors, or its committee if so delegated, except that the exercise price per share of stock options may not be less than 100% of the fair market value of the share of common stock on the date of grant and the term of the stock option may not be greater than ten years. Stock options granted to employees, officers, members of the board of directors and consultants typically vest over a four-year period. The Company's board of directors values the Company's common stock, taking into consideration its most recently available valuation of common stock performed by third parties as well as additional factors which may have changed since the date of the most recent contemporaneous valuation through the date of grant.

During the years ended December 31, 2016, 2017 and 2018, the Company granted to employees and directors options to purchase 2,444,935 shares, 1,641,500 shares and 4,761,490, respectively, of common stock. The Company recorded stock-based compensation expense for options granted to employees and directors of $421, $441 and $714 during the years ended December 31, 2016, 2017 and 2018, respectively.

During the years ended December 31, 2016, 2017 and 2018, the Company granted to non-employee consultants options to purchase 207,004 shares, 72,000 shares and 42,750 shares, respectively, of common stock.

The Company recorded stock-based compensation expense for options granted to non-employee consultants of $91, $51 and $45 during the years ended December 31, 2016, 2017 and 2018, respectively.

Stock Option Valuation

The fair value of stock option grants is estimated using the Black-Scholes option-pricing model. The Company historically has been a private company and lacks company-specific historical and implied volatility information. Therefore, it estimates its expected stock volatility based on the historical volatility of a publicly traded set of peer companies and expects to continue to do so until such time as it has adequate historical data regarding the volatility of its own traded stock price. For options with service-based vesting conditions, the expected term of the Company's stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla" options. The expected term of stock options granted to non-employee consultants is equal to the contractual term of the option award. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company has never paid cash dividends and does not expect to pay any cash dividends in the foreseeable future.

The following table presents, on a weighted average basis, the assumptions used in the Black-Scholes option-pricing model to determine the grant-date fair value of stock options granted to employees and directors:

	Year Ended December 31,		
	2016	2017	2018
Risk-free interest rate	1.4%	2.1%	2.8%
Expected term (in years)	5.77	6.06	5.94
Expected volatility	81.8%	77.3%	86.0%
Expected dividend yield	0%	0%	0%

The following table presents, on a weighted average basis, the assumptions used in the Black-Scholes option-pricing model to determine the grant-date fair value of stock options granted to non-employee consultants:

	Year Ended December 31,		
	2016	2017	2018
Risk-free interest rate	2.0%	2.1%	2.2%
Expected term (in years)	9.36	9.52	9.49
Expected volatility	78.0%	81.8%	85.8%
Expected dividend yield	0%	0%	0%

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Stock Options

The following table summarizes the Company's stock option activity since December 31, 2016:

	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value
Outstanding as of December 31, 2016	3,501,276	$ 0.65	9.19	$ —
Granted	1,713,500	0.65		
Exercised	(14,583)	0.65		
Forfeited	(209,500)	0.65		
Outstanding as of December 31, 2017	4,990,693	$ 0.65	8.51	$ 100
Granted	4,804,240	0.89		
Exercised	(11,000)	0.65		
Forfeited	(1,387,605)	0.67		
Outstanding as of December 31, 2018	8,396,328	$ 0.79	8.42	$ 6,486
Vested and expected to vest as of December 31, 2018	7,461,678	$ 0.77	8.29	$ 5,864
Options exercisable as of December 31, 2018	3,156,736	$ 0.65	6.91	$ 2,865

The aggregate intrinsic value of options is calculated as the difference between the exercise price of the stock options and the fair value of the Company's common stock for those options that had exercise prices lower than the fair value of the Company's common stock.

The aggregate intrinsic value of stock options exercised during the year ended December 31, 2016 was $22. There was no intrinsic value for stock options exercised during the year ended December 31, 2017 and there was an insignificant intrinsic value for the stock options exercised during the year ended December 31, 2018.

The weighted average grant-date fair value per share of stock options granted during the years ended December 31, 2016, 2017 and 2018 was $0.45, $0.45 and $0.67, respectively.

Restricted Common Stock

During the year ended December 31, 2016, 6,500 shares of restricted common stock granted under the 2015 Plan vested. As of December 31, 2016, 2017 and 2018, no shares of unvested restricted common stock were outstanding.

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Stock-Based Compensation

Stock-based compensation expense was classified in the consolidated statements of operations and comprehensive loss as follows:

	Year Ended December 31,		
	2016	2017	2018
Research and development expenses	$ 139	$ 126	$ 258
General and administrative expenses	373	366	501
	$ 512	$ 492	$ 759

As of December 31, 2018, total unrecognized compensation expense related to unvested stock options held by employees and directors was $2,336, which is expected to be recognized over a weighted average period of 1.3 years.

As of December 31, 2018, there were outstanding unvested service-based stock options held by non-employee consultants for the purchase of 3,625 shares of common stock. Amounts expensed during the remaining vesting periods of the stock options held by non-employee consultants will be determined based on the fair value of the awards at the time of vesting.

12. License Agreements

Genzyme Agreement

In July 2014, the Company entered into a license agreement (the “Genzyme Agreement”) with Genzyme pursuant to which the Company was granted an exclusive license to certain patents and intellectual property owned or controlled by Genzyme related to the CXCR4 receptor to develop and commercialize products containing licensed compounds (including but not limited to X4P-001) for all therapeutic, prophylactic and diagnostic uses, with the exception of autologous and allogenic human stem cell therapy. Under the terms of the Genzyme Agreement, the Company is obligated to use commercially reasonable efforts to develop and commercialize licensed products for use in the field in the United States and at least one other major market country. The Company has the right to grant sublicenses of the licensed rights that cover X4P-001 to third parties.

In exchange for these rights, in August 2014, the Company made an upfront payment of $50 to Genzyme. The Company accounted for the acquisition of technology as an asset acquisition because it did not meet the definition of a business. The Company recorded the upfront payment as research and development expense in the consolidated statement of operations and comprehensive loss because the acquired technology represented in-process research and development and had no alternative future use. In August 2015, as a result of the closing of the Company’s Series A preferred stock financing, the Company made an additional cash payment of $300 to Genzyme and issued to Genzyme 1,129,823 shares of its common stock (see Note 9), each as required by the Genzyme Agreement. The $300 payment and the $734 fair value of the 1,129,823 shares of common stock issued to Genzyme were recorded as research and development expense in the consolidated statements of operations and comprehensive loss for the year ended December 31, 2015. Genzyme has the right to require the Company to repurchase all, but not less than all, of these shares of common stock at any time during the term of the Genzyme

Agreement for a price of $0.01 per share. Due to this redemption feature, the shares of common stock issued to Genzyme are classified outside of stockholders' deficit on the consolidated balance sheets as of December 31, 2017 and 2018.

Under the Genzyme Agreement, the Company is obligated to pay Genzyme milestone payments in the aggregate amount of up to $25,000, contingent upon the achievement by the Company of certain late-stage regulatory and sales milestones with respect to licensed products. In addition, the Company may be required to make a one-time milestone payment to Genzyme upon the consummation by the Company of a change of control transaction, in an amount equal to 5.5% of the consideration paid to equity holders of the Company, other than Genzyme, in connection with such change of control transaction, after deducting outstanding debt obligations of the Company and the aggregate cash investments made by equity holders into the Company prior to the closing of the change of control transaction. The merger with Arsanis qualifies as a change of control transaction, as defined in the license agreement, but results in no payment being due to Genzyme under the license agreement.

The Company concluded that this contingent payment obligation meets the definition of a derivative instrument as the contingent payment obligation is not clearly and closely related to its host instrument and is a cash-settled liability (see Note 2). Accordingly, the Company classifies this derivative as a liability within other liabilities (non-current) on its consolidated balance sheet (see Note 2), and changes in the fair value of the derivative liability are recognized as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss (see Note 3). On March 13, 2019, the closing date of the merger with Arsanis, this derivative liability was remeasured to fair value, which was $0, and subsequent changes in fair value will no longer be recognized in the consolidated statements of operations and comprehensive loss because the contingent payment obligation expired at that time.

Under the Genzyme Agreement, the Company is obligated to pay Genzyme tiered royalties based on net sales of licensed products that the Company commercializes under the agreement. The obligation to pay royalties for each licensed product expires on a country-by-country basis on the latest of (i) the expiration of licensed patent rights that cover that licensed product in that country, (ii) the expiration of regulatory exclusivity in that country and (iii) ten years after the first commercial sale of such licensed product in that country. Royalty rates are subject to reduction under the agreement in specified circumstances, including in any country if the Company is required to obtain a license from any third party to the extent the Company's patent rights might infringe the third party's patent rights, if a licensed product is not covered by a valid claim in that country or if sales of generic products reach certain thresholds in that country. If the Company enters into a sublicense under the agreement, the Company will be obligated to pay Genzyme a percentage of certain upfront fees, maintenance fees, milestone payments and royalty payments paid to the Company by the sublicensee.

Under the Genzyme Agreement, the Company will itself manufacture and supply, or enter into manufacturing or supply agreements with Genzyme or third parties to manufacture and supply, clinical and commercial supplies of licensed compounds and each licensed product. During the years ended December 31, 2016, 2017 and 2018, the Company did not enter into any third-party manufacturing or supply agreements in connection with the Genzyme Agreement. The Company is also responsible for all costs related to the filing, prosecution and maintenance of the licensed patent rights.

The Genzyme Agreement will remain in effect until the expiration of the royalty term in all countries for all licensed products. The agreement may be terminated by either party with at least 90 days' notice in the event of material breach by the other party that remains uncured for 90 days, by either party for insolvency or bankruptcy

of the other party, immediately by Genzyme if the Company challenges the licensed patents, or immediately by the Company if a material safety issue arises.

During the years ended December 31, 2016, 2017 and 2018, the Company did not incur any payment obligations to Genzyme under the Genzyme Agreement and no milestone payments were made or due under the Genzyme Agreement.

Georgetown Agreement

In December 2016, the Company entered into a license agreement (the "Georgetown Agreement") with Georgetown University ("Georgetown") pursuant to which the Company obtained an exclusive, worldwide license to make, have made, use, sell, offer for sale and import of products covered by patent rights co-owned by Georgetown. The rights licensed to the Company are for all therapeutic, prophylactic and diagnostic uses in all disease indications in humans and animals.

Under the terms of the Georgetown Agreement, the Company paid a one-time only, upfront fee of $50 and the Company may be required to pay milestone payments of up to an aggregate of $800 related to commercial sales of a product. The Company accounted for the acquisition of technology as an asset acquisition because it did not meet the definition of a business. The Company recorded the upfront payment as research and development expense in the consolidated statement of operations and comprehensive loss because the acquired technology represented in-process research and development and had no alternative future use.

Under the Georgetown Agreement, the Company is solely responsible for all development and commercialization activities and costs in its respective territories. The Company is also responsible for all costs related to the filing, prosecution and maintenance of the licensed patent rights.

The term of the Georgetown Agreement will continue until the expiration of the last valid claim within the patent rights covering the product. Georgetown may terminate the agreement in the event (i) the Company fails to pay any amount and fails to cure such failure within 30 days after receipt of notice, (ii) the Company defaults in its obligation to obtain and maintain insurance and fails to remedy such breach within 45 days after receipt of notice, or (iii) the Company declares insolvency or bankruptcy. The Company may terminate the agreement at any time upon at least 60 days' written notice.

During the year ended December 31, 2016, the Company recorded research and development expense of $50 in connection with the Georgetown Agreement. During the years ended December 31, 2017 and 2018, the Company did not incur any payment obligations to Georgetown under the Georgetown Agreement and no milestone payments were made or due under the Georgetown Agreement.

Beth Israel Deaconess Medical Center Agreement

In December 2016, the Company entered into a license agreement (the "BIDMC Agreement") with Beth Israel Deaconess Medical Center ("BIDMC"), pursuant to which the Company obtained an exclusive, worldwide license to make, have made, use, sell, offer for sale and import of products covered by patent rights co-owned by BIDMC. The rights licensed to the Company are for all fields of use.

Under the terms of the BIDMC Agreement, the Company paid a one-time only, upfront fee of $20 and the Company is responsible for all future patent prosecution costs. The Company accounted for the acquisition of

technology as an asset acquisition because it did not meet the definition of a business. The Company recorded the upfront payment as research and development expense in the consolidated statement of operations and comprehensive loss because the acquired technology represented in-process research and development and had no alternative future use.

The term of the BIDMC Agreement will continue until the expiration of the last valid claim within the patent rights covering the licensed products. BIDMC may terminate the agreement in the event (i) the Company fails to pay any amount and fails to cure such failure within 15 days after receipt of notice, (ii) the Company is in material breach of any material provision of the agreement and fails to remedy such breach within 60 days after receipt of notice, or (iii) the Company declares insolvency or bankruptcy. We may terminate the agreement at any time upon at least 90 days' written notice.

During the year ended December 31, 2016, the Company recorded research and development expense of $20 in connection with the BIDMC Agreement. The Company did not incur any payment obligations under the BIDMC Agreement during the years ended December 31, 2017 and 2018.

13. Income Taxes

2017 U.S. Tax Reform

On December 22, 2017, the Tax Cuts and Jobs Act ("TCJA") was signed into United States law. The TCJA included a number of changes to tax law, including, among other things, a permanent reduction in the federal corporate income tax rate from a top marginal tax rate of 35% to a flat rate of 21%, effective as of January 1, 2018, as well as limitation of the deduction for net operating losses to 80% of annual taxable income and elimination of net operating loss carrybacks, in each case, for losses arising in taxable years beginning after December 31, 2017 (though any such net operating losses may be carried forward indefinitely). The federal tax rate change resulted in a reduction in the gross amount of the Company's deferred tax assets recorded as of December 31, 2017 and a corresponding reduction in the Company's valuation allowance. As a result, no income tax expense or benefit was recognized as of the enactment date of the TCJA.

As permitted by Securities and Exchange Commission Staff Accounting Bulletin No. 118, *Income Tax Accounting Implications of the Tax Cuts and Jobs Act*, the Company recorded provisional estimates of the impact of the TCJA as of December 22, 2017 and for the year ended December 31, 2017. In December 2018, the Company finalized its accounting analysis of the impact of the TCJA based on the guidance, interpretations and data available during the year ended December 31, 2018. As a result of finalizing the accounting analysis, the Company did not record any adjustments to the provisional amounts recorded in 2017.

Income Taxes

During the years ended December 31, 2016, 2017 and 2018, the Company recorded no income tax benefits for the net operating losses incurred or for the research and development tax credits generated in each period due to its uncertainty of realizing a benefit from those items. All of the Company's operating losses since inception have been generated in the United States.

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A summary of the Company's current and deferred tax provision is as follows:

	Year Ended December 31,		
	2016	2017	2018
Current income tax provision:			
Federal	$ —	$ —	$ —
State	—	—	—
Total current income tax provision	—	—	—
Deferred income tax benefit:			
Federal	(6,426)	(2,037)	(7,189)
State	(1,019)	(1,771)	(2,062)
Total deferred income tax benefit	(7,445)	(3,808)	(9,251)
Change in deferred tax asset valuation allowance	7,445	3,808	9,251
Total provision for income taxes	$ —	$ —	$ —

A reconciliation of the U.S. federal statutory income tax rate to the Company's effective income tax rate is as follows:

	Year Ended December 31,		
	2016	2017	2018
Federal statutory income tax rate	(34.0)%	(34.0)%	(21.0)%
State income taxes, net of federal benefit	(5.7)	(8.4)	(6.2)
Research and development tax credits	(2.1)	(1.8)	(3.7)
Change in fair value of preferred stock warrant liability	(0.1)	(2.2)	2.4
Other permanent differences	0.2	0.5	0.9
Remeasurement of deferred taxes due to the TCJA	—	27.8	—
Change in deferred tax asset valuation allowance	41.7	18.1	27.8
Other	—	—	(0.2)
Effective income tax rate	0.0%	0.0%	0.0%

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Net deferred tax assets as of December 31, 2017 and 2018 consisted of the following:

	December 31,	
	2017	**2018**
Net operating loss carryforwards	$ 8,142	$ 15,482
Research and development tax credit carryforwards	1,241	2,710
Capitalized research and development expenses	3,251	2,837
Capitalized license fees	240	221
Accrual-to-cash basis conversion	504	1,367
Other	168	180
Total deferred tax assets	13,546	22,797
Valuation allowance	(13,546)	(22,797)
Net deferred tax assets	$ —	$ —

As of December 31, 2018, the Company had U.S. federal and state net operating loss carryforwards of $56,577 and $56,981, respectively, which may be available to offset future taxable income, of which $28,918 and $56,981, respectively, begin to expire in 2034 and of which $27,659 related to U.S. federal income taxes do not expire but are limited in their usage to an annual deduction equal to 80% of annual taxable income. As of December 31, 2018, the Company also had U.S. federal and state research and development tax credit carryforwards of $2,210 and $633, respectively, which may be available to offset future tax liabilities and each begin to expire in 2029.

Utilization of the U.S. federal and state net operating loss carryforwards and research and development tax credit carryforwards may be subject to a substantial annual limitation under Sections 382 and 383 of the Internal Revenue Code of 1986 (the “Code”), and corresponding provisions of state law, due to ownership changes that have occurred previously or that could occur in the future. These ownership changes may limit the amount of carryforwards that can be utilized annually to offset future taxable income or tax liabilities. In general, an ownership change, as defined by Section 382, results from transactions increasing the ownership of certain stockholders or public groups in the stock of a corporation by more than 50% over a three-year period. The Company has not conducted a study to assess whether a change of control has occurred or whether there have been multiple changes of control since inception due to the significant complexity and cost associated with such a study. If the Company has experienced a change of control, as defined by Section 382, at any time since inception, utilization of the net operating loss carryforwards or research and development tax credit carryforwards would be subject to an annual limitation under Section 382, which is determined by first multiplying the value of the Company’s stock at the time of the ownership change by the applicable long-term tax-exempt rate, and then could be subject to additional adjustments, as required. Any limitation may result in expiration of a portion of the net operating loss carryforwards or research and development tax credit carryforwards before utilization. Further, until a study is completed by the Company and any limitation is known, no amounts are being presented as an uncertain tax position.

The Company has evaluated the positive and negative evidence bearing upon its ability to realize the deferred tax assets. Management has considered the Company’s history of cumulative net losses incurred since inception and its lack of commercialization of any products or generation of any revenue from product sales since inception and has concluded that it is more likely than not that the Company will not realize the benefits of the deferred tax assets. Accordingly, a full valuation allowance has been established against the net deferred tax

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assets as of December 31, 2017 and 2018. Management reevaluates the positive and negative evidence at each reporting period.

Changes in the valuation allowance for deferred tax assets during the years ended December 31, 2016, 2017 and 2018 related primarily to the increase in net operating loss carryforwards and research and development tax credit carryforwards in 2016, 2017 and 2018, and the impact of the TCJA in 2017, and were as follows:

	Year Ended December 31,		
	2016	2017	2018
Valuation allowance as of beginning of year	$2,294	$ 9,738	$13,546
Increases recorded to income tax provision	8,066	9,786	9,730
Decreases recorded as a benefit to income tax provision	(622)	(5,978)	(479)
Valuation allowance as of end of year	$9,738	$13,546	$22,797

As of December 31, 2016, 2017 and 2018, the Company had not recorded any amounts for unrecognized tax benefits. The Company's policy is to record interest and penalties related to income taxes as part of its income tax provision. As of December 31, 2016, 2017 and 2018, the Company had no accrued interest or penalties related to uncertain tax positions and no amounts had been recognized in the Company's consolidated statements of operations and comprehensive loss. The Company files income tax returns in the U.S. and Massachusetts, as prescribed by the tax laws of the jurisdictions in which it operates. In the normal course of business, the Company is subject to examination by federal and state jurisdictions, where applicable. There are currently no pending tax examinations. The Company is open to future tax examination under statute from 2015 to the present; however, carryforward attributes that were generated prior to 2015 may still be adjusted upon examination by federal, state or local tax authorities if they either have been or will be used in a future period.

14. Net Loss per Share

Basic and diluted net loss per share attributable to common stockholders was calculated as follow:

	Year Ended December 31,		
	2016	2017	2018
Numerator:			
Net loss	$ (17,865)	$ (21,994)	$ (33,285)
Accruing dividends on Series A convertible preferred stock	(3,008)	(3,000)	(3,000)
Adjustment to accumulated deficit in connection with repurchase of Series Seed convertible preferred stock	—	—	(22)
Net loss attributable to common stockholders	$ (20,873)	$ (24,994)	$ (36,307)
Denominator:			
Weighted average common shares outstanding—basic and diluted	4,765,234	4,818,327	4,826,910
Net loss per share attributable to common stockholders—basic and diluted	$ (4.38)	$ (5.19)	$ (7.52)

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The Company has included 1,129,823 shares of redeemable common stock in its computation of basic and diluted weighted average common shares outstanding for the years ended December 31, 2016, 2017 and 2018 as this class of stock participates in losses similarly to other common stockholders.

The Company's potentially dilutive securities, which include stock options, convertible preferred stock, and warrants to purchase shares of convertible preferred stock, have been excluded from the computation of diluted net loss per share as the effect would be to reduce the net loss per share. Therefore, the weighted average number of common shares outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares, presented based on amounts outstanding at each period end, from the computation of diluted net loss per share attributable to common stockholders for the periods indicated because including them would have had an anti-dilutive effect:

	Year Ended December 31,		
	2016	2017	2018
Options to purchase common stock	3,501,276	4,990,693	8,400,328
Convertible preferred stock (as converted to common stock)	22,061,973	38,018,968	40,079,567
Warrants to purchase convertible preferred stock (as converted to common stock)	1,641,494	4,457,040	5,146,400
	27,204,743	47,466,701	53,626,295

In addition to the potentially dilutive securities noted above, as of December 31, 2018, the Company had agreed to issue warrants for the purchase of a specified number of shares of convertible preferred stock or, if issued following the merger with Arsanis, a specified number of shares of common stock of the combined organization (see Note 8). As of December 31, 2018, the warrants had not been issued. Accordingly, the Company excluded these warrants from the table above.

15. Commitments and Contingencies

Lease Agreements

In January 2017, the Company entered into an operating lease for office space in Cambridge, Massachusetts, which expires in July 2022. The lease includes provisions for leasehold improvement reimbursements from the landlord totaling $314 and annual rent escalations. In connection with entering into this lease agreement, the Company issued a letter of credit of $264, which is classified as restricted cash (non-current) on the consolidated balance sheets as of December 31, 2017 and 2018.

The Company recognizes rent expense on a straight-line basis over the respective lease period and has recorded deferred rent for rent expense incurred but not yet paid (see Note 2). Rent expense was $337, $843 and $700 for the years ended December 31, 2016, 2017 and 2018, respectively.

The Company also leases computer equipment under a capital lease that expires in April 2020.

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Future minimum lease commitments under operating and capital leases as of December 31, 2018 are as follows:

Year Ending December 31,	Operating Leases	Capital Leases	Total
2019	$ 810	$ 15	$ 825
2020	823	5	828
2021	835	—	835
2022	492	—	492
Total	$ 2,960	20	$2,980
Less: Amount representing interest		(2)	
Present value of minimum lease payments		$ 18	

Sponsored Research Agreement Commitments

In April 2017, the Company entered into a sponsored research agreement with a university that the Company refers to as the Sponsored Research Agreement, pursuant to which the Company and the university intend to conduct a research program related to understanding the mechanisms of failed long-term adaptive immunity in WHIM patients. Under the terms of the Sponsored Research Agreement, the Company agreed to provide funding for the research program of up to $499 over a three-year period. The Sponsored Research Agreement will remain in effect for three years, unless earlier terminated in the event that (i) either party materially breaches any representation, obligation or covenant and fails to remedy such breach within 30 days after receipt of notice or (ii) the Principal Investigator, as defined in the agreement, is unable or unwilling to conduct the research or perform his or her obligations under the agreement, at which time the Company may terminate the agreement upon 30 days' prior written notice to the university. The Company may terminate the agreement at any time upon at least 60 days' prior written notice.

During the years ended December 31, 2017 and 2018, the Company incurred $111 and $166, respectively, of research and development expenses related to its payment obligations to the university under the Sponsored Research Agreement. As of December 31, 2018, the Company had non-cancelable purchase commitments under this agreement totaling $222, with $166 committed in 2019 and $56 committed in 2020.

Manufacturing Commitments

During the years ended December 31, 2017 and 2018, the Company entered into agreements with several contract manufacturing organizations to provide preclinical and clinical trial materials. As of December 31, 2018, the Company had non-cancelable purchase commitments under these agreements totaling $238, all committed in 2019.

Indemnification Agreements

In the ordinary course of business, the Company may provide indemnification of varying scope and terms to vendors, lessors, business partners and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements or from intellectual property infringement claims made by third

parties. In addition, the Company has entered into indemnification agreements with members of its board of directors and its executive officers that will require the Company, among other things, to indemnify them against certain liabilities that may arise by reason of their status or service as directors or officers. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is, in many cases, unlimited. To date, the Company has not incurred any material costs as a result of such indemnifications. The Company is not currently aware of any indemnification claims and has not accrued any liabilities related to such obligations in its consolidated financial statements as of December 31, 2017 or 2018.

Legal Proceedings

The Company is not a party to any litigation and does not have contingency reserves established for any litigation liabilities. At each reporting date, the Company evaluates whether or not a potential loss amount or a potential range of loss is probable and reasonably estimable under the provisions of the authoritative guidance that addresses accounting for contingencies. The Company expenses as incurred the costs related to such legal proceedings.

16. Benefit Plans

The Company established a defined contribution savings plan under Section 401(k) of the Code. This plan covers all employees who meet minimum age and service requirements and allows participants to defer a portion of their annual compensation on a pre-tax basis. Matching contributions to the plan may be made at the discretion of the Company's board of directors. The Company made no contributions to the plan during the years ended December 31, 2016, 2017 and 2018.

17. Subsequent Events

For its consolidated financial statements as of December 31, 2018 and for the year then ended, the Company evaluated subsequent events through April 2, 2019, the date on which those financial statements were issued.

Settlement Agreement with FFG

On March 8, 2019, Arsanis, Merger Sub, the Company and Arsanis Biosciences GmbH ("Arsanis GmbH"), a wholly owned subsidiary of Arsanis, entered into a settlement agreement (the "Settlement Agreement") with Österreichische Forschungsförderungsgesellschaft GmbH ("FFG") in respect to allegations by FFG in February 2019 that Arsanis and Arsanis GmbH breached certain reporting, performance and other obligations in connection with grants and loans made by FFG to Arsanis GmbH between September 2011 and March 2017 to fund qualifying research and development expenditures.

Pursuant to the terms of the Settlement Agreement, in exchange for FFG's waiver of all claims against Arsanis and Arsanis GmbH (except for its claims for repayment of the loans and regular interest but including its waiver of claims for repayment of grants and interest exceeding regular interest), subject to compliance by Arsanis and Arsanis GmbH with the terms of the Settlement Agreement, Arsanis GmbH agreed to repay the outstanding loan principal equal to EUR 8,505 ($9,526 based on an exchange rate of US$1.12 per EUR 1.00 on March 27, 2019) (plus regular interest accrued thereon) on an accelerated payment schedule of three years instead of five years, with the final accelerated installment due and payable on June 30, 2021. The parties also

agreed, among other things, that (i) the portion of such loans to be repaid in 2019 is EUR 2,596 ($2,908, based on an exchange rate of US$1.12 per EUR 1.00 on March 27, 2019) (the “2019 Payment”) and such payment will be made on March 31, 2019 and (ii) until all of the loans have been repaid and subject to other terms specified in the Settlement Agreement, a minimum cash balance equal to 70% of the then-outstanding principal amount of the loans will be maintained at Arsanis GmbH in an account held with an Austrian bank. If Arsanis or Arsanis GmbH breaches specified obligations under the Settlement Agreement (and fails to cure such breach during any applicable grace period), FFG is entitled to accelerate the repayment of any outstanding loans.

As the accounting acquirer in the merger with Arsanis, the Company will assume and account for these FFG loans and FFG-related obligations and commitments in the business combination.

Second Amendment to the Merger Agreement

On March 8, 2019, in connection with the Settlement Agreement, the Company and Arsanis amended the Merger Agreement to deduct one-third of the 2019 Payment, which equaled EUR 865 (approximately $969, based on an exchange rate of US$1.12 per EUR 1.00 on March 27, 2019), from Arsanis’s net cash, as defined in the Merger Agreement, at closing. As a result, the exchange ratios for the Company’s common stock and preferred stock in the merger were adjusted. Specifically, prior to this amendment, the Merger Agreement excluded the principal amount of approximately $9,526 of FFG loans to Arsanis GmbH from the deduction for unpaid indebtedness that otherwise reduced Arsanis’s net cash at closing. The amendment provided that this excluded amount, and thus net cash, be reduced by one-third of Arsanis’s accelerated payment amount, or $969, to approximately $8,557.

Completion of Merger with Arsanis and Reverse Stock Split

On March 13, 2019, the Company, Arsanis and Merger Sub completed the merger pursuant to the terms of the Merger Agreement. Pursuant to the terms of the Merger Agreement, each outstanding share of the Company’s common stock and preferred stock was exchanged for 0.5702 shares of Arsanis’s common stock (the “Exchange Ratio”). In addition, all outstanding options exercisable for common stock and warrants exercisable for convertible preferred stock of the Company became options and warrants exercisable for the same number of shares of common stock of Arsanis multiplied by the Exchange Ratio. Immediately following the closing of the merger, the combined organization effected a 6-for-1 reverse stock split of its common stock and changed its name to X4 Pharmaceuticals, Inc. In connection with the merger, the Company changed its name to X4 Therapeutics, Inc. Following the closing of the merger, X4 Therapeutics, Inc. is a wholly owned subsidiary of X4 Pharmaceuticals, Inc.

As a result of the reverse stock split, the per share exercise price of, and the number of shares subject to, such options and warrants were automatically proportionally adjusted based on the 6-for-1 reverse stock split ratio in accordance with the terms of such options and warrants. No fractional shares were issued in connection with the reverse stock split.

Immediately following the merger and the reverse stock split, stockholders of the Company owned approximately 63.7% of the combined organization’s outstanding common stock. On March 14, 2019, the combined organization’s common stock began trading on The Nasdaq Capital Market under the ticker symbol “XFOR.” The accompanying consolidated financial statements and notes of the Company do not give effect to the merger or the reverse stock split (see Note 1).

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Issuance of Warrants in connection with the First Amendment to the Hercules Loan Agreement

On March 18, 2019, as a result of the closing of the merger with Arsanis on March 13, 2019, the Company issued to Hercules warrants for the purchase of 5,000 shares of common stock of the combined organization at an exercise price of $19.80 per share, each of which reflected the share Exchange Ratio of 1-for-0.5702 applied in the merger as well as the 6-for-1 reverse stock split effected by the combined organization on March 13, 2019 (see Note 8). The warrants were immediately exercisable and expire in March 2029.

EXHIBIT 99.2

UNAUDITED PRO FORMA COMBINED FINANCIAL STATEMENTS

On November 26, 2018, Arsanis, Inc. ("Arsanis"), X4 Pharmaceuticals, Inc. ("X4") and Artemis AC Corp., a wholly owned subsidiary of Arsanis ("Merger Sub"), entered into an Agreement and Plan of Merger, as amended on December 20, 2018 and March 8, 2019 (the "Merger Agreement"), pursuant to which Merger Sub merged with and into X4, with X4 surviving as a wholly owned subsidiary of Arsanis and the surviving corporation of the merger (the "Merger"). The Merger was completed on March 13, 2019 pursuant to the terms of the Merger Agreement. At the effective time of the Merger (the "Effective Time"), each share of X4's common stock, par value $0.001 per share ("X4 Common Stock") outstanding immediately prior to the Effective Time (excluding certain shares canceled pursuant to the Merger Agreement and shares held by stockholders who exercised and perfected appraisal rights or dissenters' rights) was converted into the right to receive shares of Arsanis's common stock, par value $0.001 per share ("Arsanis Common Stock"), based on an exchange ratio set forth in the Merger Agreement (the "Common Stock Exchange Ratio"). At the Effective Time, the Common Stock Exchange Ratio was determined to be 0.5702 shares of Arsanis Common Stock for each share of X4 Common Stock. Each share of X4's preferred stock, par value $0.001 per share ("X4 Preferred Stock" and, together with X4 Common Stock, "X4 Capital Stock"), outstanding immediately prior to the Effective Time (excluding certain shares canceled pursuant to the Merger Agreement and shares held by stockholders who exercised and perfected appraisal rights or dissenters' rights) was converted into the right to receive Arsanis Common Stock based on an exchange ratio set forth in the Merger Agreement (the "Preferred Stock Exchange Ratio" and, together with the Common Stock Exchange Ratio, the "Exchange Ratios"). The Preferred Stock Exchange Ratio was equal to the Common Stock Exchange Ratio because each share of X4 Preferred Stock was convertible into one share of X4 Common Stock. At the closing of the Merger on March 13, 2019, Arsanis issued an aggregate of 25,675,930 shares of its common stock to X4 stockholders, based on the Common Stock Exchange Ratio of 0.5702 shares of Arsanis Common Stock for each share of X4 Common Stock and the Preferred Stock Exchange Ratio of 0.5702 shares of Arsanis Common Stock for each share of X4 Preferred Stock and before giving effect to the Reverse Stock Split described below. Immediately following the closing of the Merger, Arsanis effected a 6-for-1 reverse stock split of the Arsanis Common Stock (the "Reverse Stock Split") and changed its name to X4 Pharmaceuticals, Inc., and X4, as the surviving corporation in the Merger and a wholly owned subsidiary of X4 Pharmaceuticals, Inc., changed its name to X4 Therapeutics, Inc.

On March 8, 2019, Arsanis, Merger Sub, X4 and Arsanis Biosciences GmbH ("Arsanis GmbH"), a wholly owned subsidiary of Arsanis, entered into a settlement agreement (the "Settlement Agreement") with Österreichische Forschungsförderungsgesellschaft GmbH ("FFG") in respect to allegations by FFG in February 2019 that Arsanis and Arsanis GmbH breached certain reporting, performance and other obligations in connection with grants and loans made by FFG to Arsanis GmbH between September 2011 and March 2017 to fund qualifying research and development expenditures. Pursuant to the terms of the Settlement Agreement, in exchange for FFG's waiver of all claims against Arsanis and Arsanis GmbH (except for its claims for repayment of the loans and regular interest but including its waiver of claims for repayment of grants and interest exceeding regular interest), subject to compliance by Arsanis and Arsanis GmbH with the terms of the Settlement Agreement, Arsanis GmbH agreed to repay the outstanding loan principal (plus regular interest accrued thereon) on an accelerated payment schedule of three years instead of five years, with the final accelerated installment due and payable on June 30, 2021. The parties also agreed, among other things, that (i) the portion of such loans to be repaid in 2019 is EUR 2.596 million ($2.908 million, based on an exchange rate of US$1.12 per EUR 1.00 on March 27, 2019) and such payment will be made on March 31, 2019 and (ii) until all of the loans have been repaid and subject to other terms specified in the Settlement Agreement, a minimum cash balance equal to 70% of the then-outstanding principal amount of the loans will be maintained at Arsanis GmbH in an account held with an Austrian bank.

The following unaudited pro forma combined financial information gives effect to the Merger and the Settlement Agreement. Except as otherwise noted, the unaudited pro forma combined financial information also

gives effect to the Reverse Stock Split. Amounts in the historical X4 and historical Arsanis columns of the unaudited pro forma combined financial statements do not give effect to the Reverse Stock Split.

In the unaudited pro forma combined financial statements, the Merger has been accounted for as a business combination using the acquisition method of accounting under the provisions of Financial Accounting Standards Board Accounting Standards Codification Topic 805, *Business Combinations*, or ASC 805. The Merger will be accounted for as a reverse acquisition with X4 being deemed the acquiring company for accounting purposes. Under ASC 805, X4, as the accounting acquirer, will record the assets acquired and liabilities assumed of Arsanis in the Merger at their fair values as of the acquisition date.

X4 was determined to be the accounting acquirer based on an analysis of the criteria outlined in ASC 805 and the facts and circumstances specific to the Merger, including that, immediately following the Merger: (1) former holders of X4 Capital Stock ("X4 Stockholders") own a substantial majority of the voting rights of the combined organization; (2) X4 designated a majority (five of seven) of the initial members of the board of directors of the combined organization; and (3) X4's senior management hold all key positions in senior management of the combined organization.

Because X4 has been determined to be the accounting acquirer in the Merger, but not the legal acquirer, the Merger is deemed a reverse acquisition under the guidance of ASC 805. As a result, upon consummation of the Merger, the historical financial statements of X4 became the historical financial statements of the combined organization.

The unaudited pro forma combined balance sheet data as of December 31, 2018 gives effect to the Merger and the Settlement Agreement as if each took place on December 31, 2018. The unaudited pro forma combined statement of operations data for the year ended December 31, 2018 gives effect to the Merger and the Settlement Agreement as if each took place on January 1, 2018. The historical financial statements of Arsanis and X4 have been adjusted to give pro forma effect to events that are (1) directly attributable to the Merger or the Settlement Agreement, (2) factually supportable, and (3) with respect to the unaudited pro forma combined statements of operations, expected to have a continuing impact on the combined results of operations of the combined organization.

The unaudited pro forma combined financial information is based on assumptions and adjustments that are described in the accompanying notes. The application of the acquisition method of accounting is dependent upon certain valuations and other studies that have yet to be completed. Accordingly, the pro forma adjustments reflected in the unaudited pro forma combined financial statements are preliminary and based on estimates, subject to further revision as additional information becomes available and additional analyses are performed, and have been made solely for the purpose of providing the unaudited pro forma combined financial information. Differences between the preliminary adjustments reflected in the unaudited pro forma combined financial information and the final application of the acquisition method of accounting, which is expected to be completed as soon as practicable after the closing of the Merger, may arise, and those differences could have a material impact on the accompanying unaudited pro forma combined financial information and the combined organization's future results of operations and financial position. In addition, differences between the preliminary and final adjustments will likely occur as a result of the amount of cash used for Arsanis's operations and other changes in Arsanis's assets and liabilities between December 31, 2018 and the closing date of the Merger.

The unaudited pro forma combined financial information does not give effect to the potential impact of operating efficiencies or other savings or expenses that may be associated with the integration of the two companies. The unaudited pro forma combined financial information has been prepared for illustrative purposes only and is not necessarily indicative of the financial position or results of operations in future periods or the results that actually would have been realized had Arsanis and X4 been a combined organization during the specified periods.

The unaudited pro forma combined financial statements, including the notes thereto, should be read in conjunction with the separate historical consolidated financial statements of Arsanis and X4. Arsanis's historical audited consolidated financial statements for the years ended December 31, 2018, 2017 and 2016 are included in Arsanis's Annual Report on Form 10-K for the fiscal year ended December 31, 2018, as filed with the Securities and Exchange Commission (the "SEC") on March 11, 2019. X4's historical audited consolidated financial statements for the years ended December 31, 2018, 2017 and 2016 are included as Exhibit 99.1 in this Current Report on Form 8-K.

Unaudited Pro Forma Combined Balance Sheet
December 31, 2018
(in thousands)

	Historical X4	Historical Arsanis	Merger Pro Forma Adjustments	Notes	Pro Forma Combined	Settlement Agreement Pro Forma Adjustments	Notes	Pro Forma Combined As Adjusted
Assets								
Current assets:								
Cash and cash equivalents	$ 8,134	$ 30,754	$ —		$ 38,888	$ (6,813)	(6l)	$ 32,075
Grant and incentive receivables	—	2,859	—		2,859	—		2,859
Restricted cash	—	101	—		101	—		101
Prepaid expenses and other current assets	1,205	1,366	—		2,571	—		2,571
Total current assets	9,339	35,080	—		44,419	(6,813)		37,606
Property and equipment, net	241	285	—		526	—		526
Restricted cash	364	539	—		903	6,813	(6l)	7,716
Indefinite-lived intangible assets	—	—	9,500	(6a)	9,500	—		9,500
Goodwill	—	—	19,291	(6b)	19,291	—		19,291
Other assets	—	100	—		100	—		100
Total assets	$ 9,944	$ 36,004	$ 28,791		$ 74,739	$ —		$ 74,739
Liabilities, Convertible Preferred Stock, Redeemable Common Stock and Stockholders' Equity (Deficit)								
Current liabilities:								
Accounts payable	$ 2,969	$ 545	$ —		$ 3,514	$ —		$ 3,514
Accrued expenses	3,251	4,116	7,363	(6c, d, e)	14,730	—		14,730
Unearned income	—	737	—		737	—		737
Current portion of long-term debt, net of discount	1,687	—	—		1,687	2,971	(6k)	4,658
Total current liabilities	7,907	5,398	7,363		20,668	2,971		23,639
Preferred stock warrant liability	4,947	—	(4,947)	(6f)	—	—		—
Long-term debt, including accretion, net of current portion	8,145	7,894	106	(6g)	16,145	(2,971)	(6k)	13,174
Deferred rent, net of current portion	417	—	—		417	—		417
Unearned income	—	1,107	—		1,107	—		1,107
Other liabilities	205	5	—		210	—		210
Total liabilities	21,621	14,404	2,522		38,547	—		38,547
Convertible preferred stock	64,675	—	(64,675)	(6h)	—	—		—
Redeemable common stock	734	—	(734)	(6h)	—	—		—
Stockholders' equity (deficit):								
Common stock	4	15	(12)	(6h, i, j)	7	—		7
Additional paid-in capital	2,147	156,630	(40,736)	(6f, h, i, j)	118,041	—		118,041
Accumulated other comprehensive income	—	241	(241)	(6i)	—	—		—
Accumulated deficit	(79,237)	(135,286)	132,667	(6c, d, e, i)	(81,856)	—		(81,856)
Total stockholders' equity (deficit)	(77,086)	21,600	91,678		36,192	—		36,192
Total liabilities, convertible preferred stock, redeemable common stock and stockholders' equity (deficit)	$ 9,944	$ 36,004	$ 28,791		$ 74,739	$ —		$ 74,739

See accompanying notes to the unaudited pro forma combined financial statements.

Unaudited Pro Forma Combined Statements of Operations
For the Year Ended December 31, 2018
(in thousands, except share and per share amounts)

	Historical X4	Historical Arsanis	Merger Pro Forma Adjustments	Notes	Pro Forma Combined	Settlement Agreement Pro Forma Adjustments	Notes	Pro Forma Combined As Adjusted
Revenue:								
License revenue	$ —	$ 3,500	$ —		$ 3,500	$ —		$ 3,500
Total revenue	—	3,500	—		3,500	—		3,500
Operating expenses:								
Research and development	20,346	30,979	(208)	(7a)	51,117	—		51,117
General and administrative	8,739	18,406	(3,533)	(7a, b)	23,612	—		23,612
Total operating expenses	29,085	49,385	(3,741)		74,729	—		74,729
Loss from operations	(29,085)	(45,885)	3,741		(71,229)	—		(71,229)
Other income (expense):								
Grant and incentive income	—	3,179	—		3,179	508	(7i)	3,687
Interest income	236	809	—		1,045	—		1,045
Interest expense	(720)	(1,039)	34	(7c)	(1,725)	(508)	(7i)	(2,233)
Change in fair value of preferred stock warrant liability	(3,398)	—	3,398	(7d)	—	—		—
Change in fair value of derivative liability	(89)	—	89	(7e)	—	—		—
Loss on extinguishment of debt	(229)	—	—		(229)	—		(229)
Other income (expense), net	—	(85)	—		(85)	—		(85)
Total other income (expense), net	(4,200)	2,864	3,521		2,185	—		2,185
Net loss	(33,285)	(43,021)	7,262		(69,044)	—		(69,044)
Accruing dividends on convertible preferred stock	(3,000)	—	3,000	(7f)	—	—		—
Adjustment to accumulated deficit in connection with repurchase of Series Seed convertible preferred stock	(22)	—	22	(7g)	—	—		—
Net loss attributable to common stockholders	$ (36,307)	$ (43,021)	$ 10,284		$ (69,044)	$ —		$ (69,044)
Net loss per share attributable to common stockholders—basic and diluted	$ (7.52)	$ (3.01)			$(10.29)			$(10.29)
Weighted average common shares outstanding—basic and diluted	4,826,910	14,307,934	(12,427,146)	(7h)	6,707,698			6,707,698

See accompanying notes to the unaudited pro forma combined financial statements.

Notes to Unaudited Pro Forma Combined Financial Statements

1. Description of the Transactions

Merger of X4 and Arsanis

On November 26, 2018, Arsanis, X4 and Merger Sub entered into the Merger Agreement pursuant to which Merger Sub merged with and into X4, with X4 surviving as a wholly owned subsidiary of Arsanis and the surviving corporation of the Merger. The Merger was completed on March 13, 2019 pursuant to the terms of the Merger Agreement. At the Effective Time of the Merger, each share of X4 Common Stock outstanding immediately prior to the Effective Time (excluding certain shares canceled pursuant to the Merger Agreement and shares held by stockholders who exercised and perfected appraisal rights or dissenters' rights) was converted into the right to receive shares of Arsanis Common Stock based on the Common Stock Exchange Ratio. At the Effective Time, the Common Stock Exchange Ratio was determined to be 0.5702 shares of Arsanis Common Stock for each share of X4 Common Stock. Each share of X4 Preferred Stock outstanding immediately prior to the Effective Time (excluding certain shares canceled pursuant to the Merger Agreement and shares held by stockholders who exercised and perfected appraisal rights or dissenters' rights) was converted into the right to receive Arsanis Common Stock based on the Preferred Stock Exchange Ratio. The Preferred Stock Exchange Ratio was equal to the Common Stock Exchange Ratio because each share of X4 Preferred Stock was convertible into one share of X4 Common Stock. At the closing of the Merger on March 13, 2019, Arsanis issued an aggregate of 25,675,930 shares of its common stock to X4 stockholders, based on the Common Stock Exchange Ratio of 0.5702 shares of Arsanis Common Stock for each share of X4 Common Stock and the Preferred Stock Exchange Ratio of 0.5702 shares of Arsanis Common Stock for each share of X4 Preferred Stock and before giving effect to the Reverse Stock Split described below. Immediately following the closing of the Merger, Arsanis effected a 6-for-1 reverse stock split of the Arsanis Common Stock and changed its name to X4 Pharmaceuticals, Inc., and X4, as the surviving corporation in the Merger and a wholly owned subsidiary of X4 Pharmaceuticals, Inc., changed its name to X4 Therapeutics, Inc.

Settlement Agreement with FFG

On March 8, 2019, Arsanis, Merger Sub, X4 and Arsanis GmbH, a wholly owned subsidiary of Arsanis, entered into the Settlement Agreement with FFG in respect to allegations by FFG in February 2019 that Arsanis and Arsanis GmbH breached certain reporting, performance and other obligations in connection with grants and loans made by FFG to Arsanis GmbH between September 2011 and March 2017 to fund qualifying research and development expenditures. Pursuant to the terms of the Settlement Agreement, in exchange for FFG's waiver of all claims against Arsanis and Arsanis GmbH (except for its claims for repayment of the loans and regular interest but including its waiver of claims for repayment of grants and interest exceeding regular interest), subject to compliance by Arsanis and Arsanis GmbH with the terms of the Settlement Agreement, Arsanis GmbH agreed to repay the outstanding loan principal (plus regular interest accrued thereon) on an accelerated payment schedule of three years instead of five years, with the final accelerated installment due and payable on June 30, 2021. The parties also agreed, among other things, that (i) the portion of such loans to be repaid in 2019 is EUR 2.596 million ($2.908 million, based on an exchange rate of US$1.12 per EUR 1.00 on March 27, 2019) and such payment will be made on March 31, 2019 and (ii) until all of the loans have been repaid and subject to other terms specified in the Settlement Agreement, a minimum cash balance equal to 70% of the then-outstanding principal amount of the loans will be maintained at Arsanis GmbH in an account held with an Austrian bank.

2. Basis of Presentation

The accompanying unaudited pro forma combined financial information was prepared in accordance with Article 11 of SEC Regulation S-X. The unaudited pro forma combined balance sheet as of December 31, 2018 was prepared using the historical balance sheets of X4 and Arsanis as of December 31, 2018 and gives effect to the Merger and the Settlement Agreement as if each occurred on December 31, 2018. The unaudited pro forma combined statement of operations for the year ended December 31, 2018 gives effect to the Merger and the Settlement Agreement as if each occurred on January 1, 2018 and were prepared using the historical audited

consolidated financial statements of X4 for the year ended December 31, 2018 and the historical audited consolidated financial statements of Arsanis for the year ended December 31, 2018.

Except as otherwise noted, the unaudited pro forma combined financial information also gives effect to the Reverse Stock Split. Amounts in the historical X4 and historical Arsanis columns of the unaudited pro forma combined financial statements do not give effect to the Reverse Stock Split.

The unaudited pro forma combined financial information does not include the impacts of any revenue, cost or other operating synergies that may result from the Merger or any related restructuring costs that may be contemplated.

3. Accounting Policies

During the preparation of the accompanying unaudited pro forma combined financial information, X4 was not aware of any material differences between X4's accounting policies and the accounting policies of Arsanis. In the period prior to its reporting of the business combination in connection with the Merger, X4 will continue conduct a more detailed review of Arsanis's accounting policies. As a result, X4 may identify differences between the accounting policies of the two companies that, when conformed, could have had a material impact on the accompanying unaudited pro forma combined financial information.

4. Accounting for the Merger

Based on the Common Stock Exchange Ratio and Preferred Stock Exchange Ratio of 0.5702 set forth above, immediately following the Merger, former Arsanis stockholders, Arsanis optionholders and other persons holding securities or other rights directly or indirectly convertible, exercisable or exchangeable for Arsanis Common Stock (collectively, the "Arsanis Securityholders") owned approximately 31.3% of the outstanding capital stock of the combined organization on a fully diluted basis, and former X4 Stockholders, holders of options or warrants to acquire X4 Capital Stock ("X4 Optionholders" and "X4 Warrantholders," respectively) and other persons holding securities and other rights directly or indirectly convertible, exercisable or exchangeable for X4 Capital Stock ("X4 Securityholders") owned approximately 68.7% of the outstanding capital stock of the combined organization on a fully diluted basis. At the closing of the Merger, all shares of X4 Common Stock and X4 Preferred Stock then outstanding were exchanged for an aggregate of 4,279,102 shares of Arsanis Common Stock, after giving effect to the Reverse Stock Split.

In addition, pursuant to the terms of the Merger Agreement, Arsanis assumed all outstanding stock options and warrants to purchase shares of X4 Common Stock at the closing of the Merger. At the closing of the Merger, such stock options became options to purchase an aggregate of 764,131 shares of Arsanis Common Stock and such warrants became warrants to purchase an aggregate of 493,956 shares of Arsanis Common Stock, after giving effect to the Reverse Stock Split.

The total estimated purchase price paid in the Merger has been allocated to the tangible and intangible assets acquired and liabilities assumed of Arsanis based on their preliminary estimated fair values as of the completion of the Merger, with the excess allocated to goodwill. The following summarizes the preliminary estimate of the purchase price paid in the Merger (in thousands, except share and per share amounts):

Number of shares of the combined organization owned by Arsanis stockholders(1)	2,440,582
Multiplied by the fair value per share of Arsanis Common Stock(2)	$ 18.66
Estimated purchase price	$ 45,541

(1) For purposes of this unaudited pro forma combined financial information, the number of shares of 2,440,582 represents the historical 14,643,737 shares of Arsanis Common Stock outstanding immediately prior to the closing of the Merger, adjusted for the Reverse Stock Split. In addition, for purposes of this unaudited pro forma combined financial information, the estimated purchase price does not include the impact of the portion of the fair value of certain options to acquire shares of Arsanis Common Stock attributable to precombination employee services because the amount is not expected to be material.

(2) The estimated purchase price was based on the last reported sale price of Arsanis Common Stock on the Nasdaq Global Market on March 13, 2019, the closing date of the Merger, of $3.11 per share and gives effect to the Reverse Stock Split.

Under the acquisition method of accounting, the total purchase price is allocated to the acquired tangible and intangible assets and assumed liabilities of Arsanis based on their estimated fair values as of the closing date of the Merger. Because the estimated consideration paid by X4 in the Merger is more than the estimated aggregate fair values of Arsanis's net assets acquired, goodwill equal to the difference has been reflected in the unaudited pro forma combined balance sheet. Goodwill of $19.3 million determined for the purpose of this unaudited pro forma combined financial information has been calculated using preliminary estimates of the fair value of the net assets of Arsanis as of December 31, 2018. The final determination of the amount of goodwill will be based on the final determination of the fair values of the net assets of Arsanis acquired as of the closing date of the Merger, which could be materially different from the amounts as of December 31, 2018. Management believes that the actual goodwill recorded in the business combination will be higher than the amount presented in the table below due to a decrease in the net assets of Arsanis that occurred between January 1, 2019 and the closing date of the Merger.

The following summarizes the preliminary allocation of the estimated purchase price paid in the Merger as if it had been completed on December 31, 2018 (in thousands):

Cash and cash equivalents	$ 30,754
Other current assets	4,326
Property and equipment, net	285
IPR&D indefinte-lived intangible assets	9,500
Other assets, non-current	639
Current liabilities	(10,142)
Loans payable, non-current	(8,000)
Other liabilities, non-current	(1,112)
Goodwill	19,291
Estimated purchase price	$ 45,541

The application of the acquisition method of accounting is dependent upon certain valuations and other studies that have yet to be completed. The purchase price allocation will remain preliminary until X4 management determines the fair values of assets acquired and liabilities assumed upon the closing of the Merger. The final determination of the purchase price allocation is anticipated to be completed as soon as practicable after completion of the Merger and will be based on the fair values of the assets acquired and liabilities assumed as of the closing date of the Merger. The final amounts allocated to assets acquired and liabilities assumed could differ materially from the amounts presented in the unaudited pro forma combined financial statements.

5. Shares of Arsanis Common Stock Issued to X4 Stockholders upon Closing of the Merger

As part of the Merger, all outstanding shares of X4 Common Stock and X4 Preferred Stock were exchanged for shares of Arsanis Common Stock. Based on the historical 4,950,410 shares of X4 Common Stock (including 1,129,823 shares of redeemable X4 Common Stock) and the historical 40,079,567 shares of X4 Preferred Stock outstanding immediately prior to the closing of the Merger, before giving effect to the Reverse Stock Split, and based on the Common Stock Exchange Ratio and Preferred Stock Exchange Ratio determined in accordance with the terms of the Merger Agreement of 0.5702, Arsanis issued 4,279,102 shares of Arsanis Common Stock in the Merger, after giving effect to the Reverse Stock Split, determined as follows:

X4 Common Stock outstanding immediately prior to the closing of the Merger (before giving effect to the Reverse Stock Split)	3,820,587
Redeemable X4 Common Stock outstanding immediately prior to the closing of the Merger (before giving effect to the Reverse Stock Split)	1,129,823
X4 Common Stock outstanding immediately prior to the closing of the Merger	4,950,410
Common Stock Exchange Ratio	0.5702
Subtotal	2,822,723
X4 Preferred Stock outstanding immediately prior to the closing of the Merger (before giving effect to the Reverse Stock Split)	40,079,567
Preferred Stock Exchange Ratio	0.5702
Subtotal	22,853,207
Shares of Arsanis Common Stock issued to X4 Stockholders upon closing of the Merger (before giving effect to the Reverse Stock Split)	25,675,930
Reverse Stock Split Ratio	6.0000
Shares of Arsanis Common Stock issued to X4 Stockholders upon closing of the Merger (after giving effect to the Reverse Stock Split)	4,279,102

In addition, in connection with the Merger, Arsanis assumed all of the outstanding options and warrants to acquire X4 stock and such options and warrants became exercisable for shares of Arsanis Common Stock following the Merger. See Note 4.

6. Adjustments to Unaudited Pro Forma Combined Balance Sheet as of December 31, 2018

The unaudited pro forma combined balance sheet includes pro forma adjustments that are (1) directly attributable to the Merger or the Settlement Agreement and (2) factually supportable. Based on X4's management's review of Arsanis's summary of significant accounting policies, the nature and amount of any adjustments to the historical financial statements of Arsanis to conform to the accounting policies of X4 are not expected to be significant. The pro forma adjustments, based on preliminary estimates that could change materially as additional information is obtained, are as follows:

Merger Pro Forma Adjustments

(a) Represents adjustments to record identifiable intangible assets of Arsanis at their fair values as of the closing date of the Merger. The estimated fair values of identifiable intangible assets are preliminary and are determined based on assumptions that market participants would use in pricing an asset, based on the most advantageous market for the asset (i.e., its highest and best use). The final fair value determinations for identifiable intangible assets may differ from this preliminary determination, and such differences could be material.

The preliminary fair values were estimated using a combination of an income approach and a cost approach. The underlying assumptions and estimates used to estimate the fair values of the in-process research and development, or IPR&D, indefinite-lived intangible assets could change. For this and other reasons, actual results could vary materially from estimated results. Because the IPR&D intangible assets are indefinite-lived intangible assets, no pro forma adjustment for related amortization has been reflected in the unaudited pro forma combined statements of operations. The IPR&D intangible assets are subject to testing for impairment annually and upon other triggering events. These intangible assets would only be amortized over their respective estimated useful lives after approval, if any, by the FDA or other regulatory agencies.

A summary of the adjustment to record the identifiable intangible assets acquired in connection with the Merger at their estimated fair values is as follows (in thousands):

In-Process Research & Development:	
ASN500 Respiratory Syncytial Virus (RSV)	$ 4,500
ASN200 E. coli	3,300
ASN300 K. pneumoniae	1,700
Total IPR&D indefinite-lived intangible assets	$ 9,500

(b) Represents an adjustment to record goodwill resulting from the Merger. Goodwill represents the excess of the aggregate purchase consideration over the preliminary estimated fair values of recorded tangible and intangible assets acquired and liabilities assumed in the Merger. The actual amount of goodwill to be recorded in connection with the Merger is subject to change once X4's valuation of the fair value of tangible and intangible assets acquired and liabilities assumed has been completed. The final valuation of such assets and liabilities is expected to be completed as soon as practicable but no later than one year after the consummation of the Merger. See Note 4 for the calculation of the residual amount of goodwill estimated to be recorded in connection with the Merger.

(c) Represents an increase to accrued liabilities of $5.0 million related to transaction costs incurred or to be incurred after December 31, 2018 by X4 and Arsanis in connection with the Merger, principally consisting of financial advisor, legal, insurance, auditor and printer fees. Approximately $1.1 million of the transaction costs relate to X4 and have been reflected as an increase to accumulated deficit in the

unaudited combined pro forma balance sheet. Approximately $3.9 million of the transaction costs relate to Arsanis and have been reflected as an increase to goodwill in the unaudited combined pro forma balance sheet. These pro forma adjustments are not reflected in the unaudited pro forma combined statements of operations as these amounts are not expected to have a continuing impact on the operating results of the combined organization.

(d) Represents an increase to accrued liabilities of $1.2 million related to retention bonuses payable to employees of Arsanis contingent upon their continued employment through the earlier of the closing date of the Merger, termination of employment without cause or March 31, 2019. This adjustment resulted in an increase to accumulated deficit of $0.4 million related to retention bonuses that were determined to be for the benefit of X4, as they represent expenses of the combined organization. In addition, the adjustment resulted in an increase to goodwill of $0.8 million related to retention bonuses communicated by Arsanis in August and September 2018 prior to Arsanis entering into negotiations with X4 regarding the Merger as those retention bonuses were determined to be for the benefit of Arsanis. In addition to the $1.2 million of retention bonuses accrued as a liability, Arsanis has obligations of $0.2 million as of December 31, 2018 for retention bonuses communicated prior to the announcement of the proposed Merger with X4 (and unrelated to the Merger) that are payable as employees perform services for the retention period. Such amounts are not recorded as a pro forma adjustment to the unaudited pro forma combined balance sheet or unaudited pro forma combined statements of operations as they are not directly attributable to the Merger.

(e) Represents an increase to accrued liabilities, as well as a corresponding increase to accumulated deficit, of $1.1 million related to severance payable to a former executive officer of Arsanis upon termination of employment in accordance with the terms of the former executive officer's original employment agreement as that severance payment was determined to be for the benefit of X4.

(f) Represents a decrease to the preferred stock warrant liability, as well as a corresponding increase to additional paid-in capital, to give effect to all outstanding warrants to purchase shares of X4 Preferred Stock becoming warrants to purchase shares of Arsanis Common Stock pursuant to the Merger Agreement.

(g) Represents an adjustment of $0.1 million to record assumed loans payable of Arsanis at their respective fair values as of the closing date of the Merger. The estimated fair values of the loans payable are preliminary. The final fair value determinations for the loans may differ from these preliminary determinations, and such differences could be material.

(h) Represents the exchange of all outstanding shares of X4 Preferred Stock into 3,808,655 shares of Arsanis Common Stock and the exchange of all outstanding shares of redeemable X4 Common Stock into 107,370 shares of Arsanis Common Stock pursuant to the Merger Agreement, as if the Merger had occurred on December 31, 2018 and after giving effect to the Reverse Stock Split (see Note 5).

(i) Represents an adjustment to eliminate Arsanis's historical equity of $21.6 million, which represents the historical book value of Arsanis's net assets, as a result of the application of the acquisition method of accounting.

(j) Represents a decrease to common stock (at par value) of $38,000 and an increase to additional paid-in capital of $45.6 million to reflect the assumed issuance of 4,279,102 shares of Arsanis Common Stock, par value of $0.001 per share, after giving effect to the Reverse Stock Split, to X4 Stockholders in connection with the Merger.

Settlement Agreement Pro Forma Adjustments

(k) Represents a reclassification of $3.0 million from long-term debt, net of discount and current portion to current portion of long-term debt, net of discount to reflect the terms of the Settlement Agreement, pursuant to which approximately EUR 2.6 million ($3.0 million, based on an exchange rate of US$1.14

per EUR 1.00 on December 31, 2018) of outstanding loan principal of the FFG loans will be repaid on March 31, 2019.

(l) Represents a decrease to cash and cash equivalents of $6.8 million, as well as a corresponding increase to restricted cash (non-current) to reflect the terms of the Settlement Agreement, pursuant to which a minimum cash balance equal to 70% of the then-outstanding principal amount of the FFG loans must be maintained by Arsanis GmbH in an account held with an Austrian bank.

7. Adjustments to Unaudited Pro Forma Combined Statement of Operations for the Year Ended December 31, 2018

The unaudited pro forma combined statements of operations include pro forma adjustments that are (1) directly attributable to the Merger or the Settlement Agreement, (2) factually supportable and (3) expected to have a continuing impact on the results of operations of the combined organization. Based on X4's management's review of Arsanis's summary of significant accounting policies, the nature and amount of any adjustments to the historical financial statements of Arsanis to conform to the accounting policies of X4 are not expected to be significant. The pro forma adjustments, based on preliminary estimates that could change materially as additional information is obtained, are as follows:

Merger Pro Forma Adjustments

(a) Represents an adjustment to eliminate non-recurring costs of $0.2 million related to retention bonuses payable to employees of Arsanis and non-recurring employee severance costs of $0.5 million incurred by Arsanis (each determined to be for the benefit of X4, as they represent expenses of the combined organization) in connection with the Merger and recorded as expense in Arsanis's historical consolidated statement of operations for the year ended December 31, 2018 because each of these expenses are not expected to have a continuing impact on the operating results of the combined organization.

(b) Represents an adjustment to (i) eliminate non-recurring transaction costs of $1.0 million incurred by X4 in connection with the Merger and recorded as expense in X4's historical consolidated statement of operations for the year ended December 31, 2018 and (ii) eliminate non-recurring transaction costs of $2.1 million incurred by Arsanis in connection with the Merger and recorded as expense in Arsanis's historical consolidated statement of operations for the year ended December 31, 2018 because each of these expenses are not expected to have a continuing impact on the operating results of the combined organization.

(c) Represents an adjustment of $34,000 for the year ended December 31, 2018 as a reduction of interest expense related to the amortization of the fair value adjustments to the assumed loans payable of Arsanis.

(d) Represents an adjustment to eliminate an expense of $3.4 million for the year ended December 31, 2018 to eliminate the impact of the change in the fair value of preferred stock warrant liability for warrants issued by X4 as it is assumed that all warrants would have become exercisable for Arsanis Common Stock pursuant to the Merger Agreement. As a result, the preferred stock warrants would no longer be subject to fair value accounting following the assumed closing of the Merger on January 1, 2018.

(e) Represents an adjustment of $0.1 million for the year ended December 31, 2018 to eliminate the impact of the change in the fair value of the derivative liability as the Merger qualifies as a change of control event, as defined in the agreement, and the related contingent payment to Genzyme is required upon the Merger. As a result, the derivative liability would have been settled upon the assumed closing of the Merger on January 1, 2018.

(f) Represents an adjustment of $3.0 million for the year ended December 31, 2018 to eliminate the impact of accruing dividends on X4 Preferred Stock in the determination of pro forma combined net loss

attributable to common stockholders as it is assumed that all X4 Preferred Stock would have been exchanged for Arsanis Common Stock pursuant to the Merger Agreement on January 1, 2018.

(g) Represents an adjustment of $22,000 for the year ended December 31, 2018, to eliminate the impact of the repurchase of Series Seed preferred stock, including the loss on the preferred stock repurchase liability, as it is assumed that all X4 Preferred Stock would have been exchanged for Arsanis Common Stock pursuant to the Merger Agreement on January 1, 2018.

(h) Represents an adjustment to increase the weighted average number of common shares outstanding for the period after giving effect to the issuance of Arsanis Common Stock in connection with the Merger. The adjustment has been prepared to give effect to shares issued in the Merger as if such issuances had occurred on January 1, 2018. The following table presents this pro forma adjustment, after giving effect to the Reverse Stock Split, as follows (presented on a weighted average basis):

	Year Ended December 31, 2018
Weighted average shares of X4 Common Stock outstanding (before giving effect to the Common Stock Exchange Ratio of 0.5702 and the Reverse Stock Split)	4,826,910
Shares of X4 Preferred Stock outstanding immediately prior to the closing of the Merger, as assumed converted to X4 Common Stock (before giving effect to the Common Stock Exchange Ratio of 0.5702 and the Reverse Stock Split)	40,079,567
Weighted average shares of X4 Common Stock outstanding immediately prior to the closing of the Merger (before giving effect to the Common Stock Exchange Ratio of 0.5702 and the Reverse Stock Split)	44,906,477
Common Stock Exchange Ratio	0.5702
Subtotal	25,605,673
Reverse Stock Split Ratio	6.000
Weighted average shares of X4 Common Stock outstanding immediately prior to the closing of the Merger (after giving effect to the Common Stock Exchange Ratio of 0.5702 and the Reverse Stock Split)	4,267,116
Shares of Arsanis Common Stock outstanding immediately prior to the closing of the Merger (after giving effect to the Reverse Stock Split)	2,440,582
Pro forma combined weighted average number of common shares outstanding—basic and diluted	6,707,698

Settlement Agreement Pro Forma Adjustments

(i) Represents an adjustment of $0.5 million for the year ended December 31, 2018 to increase interest expense to reflect the terms of the Settlement Agreement, pursuant to which Arsanis GmbH agreed to repay the outstanding loan principal on an accelerated payment schedule of three years instead of five years. The increase in interest expense results primarily from an acceleration of the accretion of the debt discount recorded for the FFG loans. In addition, reflects a corresponding adjustment of $0.5 million for the year ended December 31, 2018 to increase grant and incentive income related to the FFG loans that bear interest at rates that are below market rates of interest.

With respect to the FFG loans, Arsanis accounts for the imputed benefit arising from the difference between a market rate of interest and the rate of interest charged by FFG as additional grant funding from FFG, and records interest expense for the FFG loans at a market rate of interest. On the date that FFG loan proceeds are received, Arsanis recognizes the portion of the loan proceeds allocated to grant funding as a discount to the carrying value of the loan and as unearned income, which is subsequently recognized as additional grant income over the term of the funding agreement.

8. Items Not Included in the Unaudited Pro Forma Combined Financial Statements

The unaudited pro forma combined statements of operations do not include any non-recurring transaction costs incurred by X4 or Arsanis after December 31, 2018 as those fees are not expected to have a continuing impact on the operations of the combined organization.

The unaudited pro forma combined statements of operations do not include the impacts of any cost or other operating synergies that may result from the Merger or any related restructuring costs that may be contemplated.

The unaudited pro forma combined statements of operations do not include an adjustment of $2.3 million for (i) retention bonuses to be paid to employees of Arsanis contingent upon their continued employment through the earlier of the closing date of the Merger, termination of employment without cause or March 31, 2019 and (ii) severance payable to a former executive officer of Arsanis upon termination of employment as such expenses are not expected to have a continuing impact on the operations of the combined organization.

The unaudited pro forma combined balance sheet and the unaudited pro forma combined statement of operations do not include an adjustment of $0.2 million as of December 31, 2018 for retention bonuses communicated prior to the announcement of the proposed Merger with X4 (and unrelated to the Merger) as such amounts are not directly attributable to the Merger.