

PROSPECTUS SUPPLEMENT
(To Prospectus dated February 19, 2019)



5,670,000 Shares of Common Stock
Pre-Funded Warrants to Purchase 2,130,000 Shares of Common Stock
Class A Warrants to Purchase 3,900,000 Shares of Common Stock

We are offering (i) 5,670,000 shares of our common stock, or for certain investors that so choose, in lieu of shares of common stock, pre-funded warrants to purchase 2,130,000 shares of our common stock, each a Pre-Funded Warrant and collectively, the Pre-Funded Warrants, accompanied by (ii) Class A warrants to purchase an aggregate 3,900,000 shares of our common stock, each a Class A Warrant and collectively, the Class A Warrants, and together with the Pre-Funded Warrants, the Warrants (and the shares of common stock issuable from time to time upon exercise of each of the Warrants), pursuant to this prospectus supplement and the accompanying prospectus. The common stock (and Pre-Funded Warrants sold in lieu of common stock) will be sold in fixed combinations with the Class A Warrants, with each one share of common stock (and for investors that purchase, in lieu of one share of common stock, a Pre-Funded Warrant to purchase one share of common stock) that we sell in this offering being accompanied by one-half of a Class A Warrant to purchase one share of common stock. For the investors that purchase Pre-Funded Warrants in lieu of common stock, the purchase price of each Pre-Funded Warrant and accompanying Class A Warrants will equal the price per share at which shares of common stock and accompanying Class A Warrants are sold to the public in this offering, or the public offering price, minus \$0.001. The shares of common stock (and Pre-Funded Warrants sold in lieu of common stock) and Class A Warrants are immediately separable and will be issued separately. The Pre-Funded Warrants and Class A Warrants will be exercisable immediately. The Pre-Funded Warrants will not have an expiration date and the Class A Warrants will expire 60 months from the date of issuance. The Pre-Funded Warrants will have an exercise price per share of common stock equal to \$0.001 and the Class A Warrants will have an exercise price per share of common stock equal to \$13.20.

Our common stock is listed on the Nasdaq Capital Market under the symbol "XFOR." The last reported sale price of our common stock on the Nasdaq Capital Market on April 11, 2019 was \$15.10 per share. There is no established public trading market for the Warrants and we do not expect a market to develop. In addition, we do not intend to apply for listing of the Warrants on any securities exchange or recognized trading system.

We are an "emerging growth company" under applicable Securities and Exchange Commission rules and will be subject to reduced public company reporting requirements for this prospectus and future filings.

Investing in our securities involves a high degree of risk. Please read "[Risk Factors](#)" beginning on page S-12 of this prospectus supplement and in the documents that are incorporated by reference into this prospectus supplement.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus supplement or the accompanying prospectus. Any representation to the contrary is a criminal offense.

	<i>Per Share and Accompanying Class A Warrants</i>	<i>Per Pre-Funded Warrant and Accompanying Class A Warrants</i>	<i>Total</i>
Public offering price	\$ 11.00	\$ 10.999	\$85,797,870
Underwriting discounts(1)	\$ 0.715	\$ 0.715	\$ 5,576,862
Proceeds, before expenses, to us	\$ 10.285	\$ 10.284	\$80,221,008

(1) We refer you to "Underwriting" beginning on page S-33 of this prospectus supplement for additional information regarding total underwriting compensation.

The underwriters expect to deliver the shares of common stock and Class A Warrants against payment on or about April 16, 2019 through the book entry facilities of the Depository Trust Company. The Pre-Funded Warrants are expected to be delivered on or about April 16, 2019.

Joint Book-Running Managers

Cowen

Stifel

Lead Manager

Canaccord Genuity

April 12, 2019.

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ABOUT THIS PROSPECTUS SUPPLEMENT

This prospectus supplement and the accompanying prospectus are part of a “shelf” registration statement on Form S-3 (File No. 333-229377) that we initially filed with the Securities and Exchange Commission, or SEC, on January 25, 2019, and that was declared effective by the SEC on February 19, 2019. This document is in two parts. The first part is this prospectus supplement, which describes the specific terms of this offering and also adds to and updates information contained in the accompanying prospectus and the documents incorporated by reference herein. The second part, the accompanying prospectus, including the documents incorporated by reference therein, provides more general information. Generally, when we refer to this prospectus, we are referring to both parts of this document combined. To the extent there is a conflict between the information contained in this prospectus supplement and the information contained in the accompanying prospectus or any document incorporated by reference therein filed prior to the date of this prospectus supplement, you should rely on the information in this prospectus supplement; provided that if any statement in one of these documents is inconsistent with a statement in another document having a later date—for example, a document incorporated by reference in the accompanying prospectus—the statement in the document having the later date modifies or supersedes the earlier statement.

We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference herein were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreements, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

You should rely only on the information contained in this prospectus supplement or the accompanying prospectus, or incorporated by reference herein. We have not authorized, and the underwriters have not authorized, anyone to provide you with information that is different. The information contained in this prospectus supplement or the accompanying prospectus, or incorporated by reference herein is accurate only as of the respective dates thereof, regardless of the time of delivery of this prospectus supplement and the accompanying prospectus or of any sale of our securities. It is important for you to read and consider all information contained in this prospectus supplement and the accompanying prospectus, including the documents incorporated by reference herein and therein, in making your investment decision. You should also read and consider the information in the documents to which we have referred you in the sections entitled “Where You Can Find More Information” and “Incorporation of Documents by Reference” in this prospectus supplement and in the sections entitled “Where You Can Find More Information” and “Incorporation by Reference” in the accompanying prospectus, respectively.

We are offering to sell, and seeking offers to buy, shares of our common stock (or Pre-Funded Warrants) and accompanying Class A Warrants only in jurisdictions where offers and sales are permitted. The distribution of this prospectus supplement and the accompanying prospectus and the offering of the securities in certain jurisdictions may be restricted by law. Persons outside the United States who come into possession of this prospectus supplement and the accompanying prospectus must inform themselves about, and observe any restrictions relating to, the offering of the common stock (or Pre-Funded Warrants) and accompanying Class A Warrants and the distribution of this prospectus supplement and the accompanying prospectus outside the United States. This prospectus supplement and the accompanying prospectus do not constitute, and may not be used in connection with, an offer to sell, or a solicitation of an offer to buy, any securities offered by this prospectus supplement and the accompanying prospectus by any person in any jurisdiction in which it is unlawful for such person to make such an offer or solicitation.

Unless the context otherwise requires, all references in this prospectus supplement and the accompanying prospectus to “the Company,” “we,” “us,” “our” and similar terms refer to X4 Pharmaceuticals, Inc. and its direct and indirect subsidiaries.

PROSPECTUS SUPPLEMENT SUMMARY

This summary highlights information contained elsewhere or incorporated by reference in this prospectus supplement and the accompanying prospectus. This summary does not contain all of the information that you should consider before deciding to invest in our common stock (or Pre-Funded Warrants) and accompanying Class A Warrants. You should read this entire prospectus supplement and the accompanying prospectus carefully, including the "Risk Factors" section contained in this prospectus supplement, our consolidated financial statements and the related notes thereto and the other documents and information incorporated by reference in this prospectus supplement and the accompanying prospectus.

Overview

We are a clinical-stage biopharmaceutical company focused on the discovery, development and commercialization of novel therapeutics for the treatment of rare diseases. Our pipeline is comprised of potentially first-in-class, oral, small molecule antagonists of chemokine receptor CXCR4, which have the potential to treat a broad range of rare diseases, including primary immunodeficiencies, or PIs, and certain types of cancer. CXCR4 is stimulated by its only chemokine ligand, CXCL12, and plays a key role in enabling the trafficking of immune cells and effectively monitoring the function of the immune system, or immunosurveillance. Overstimulation of the CXCL12/CXCR4 pathway leads to inhibition of the immune response, or immunosuppression. Our lead product candidate, mavorixafor (X4P-001), has completed a Phase 2 clinical trial in patients with Warts, Hypogammaglobulinemia, Infections, and Myelokathexis, or WHIM, syndrome, which is a PI. We plan to initiate a Phase 3 pivotal clinical trial of mavorixafor for the treatment of patients with WHIM syndrome in the second quarter of 2019 and report top-line data from this trial in 2021. Beyond WHIM syndrome, we plan to initiate a Phase 1 clinical trial of mavorixafor in another PI, severe congenital neutropenia, or SCN, and a Phase 1/2 clinical trial of mavorixafor in Waldenström macroglobulinemia, or WM, in 2019. We expect to report data from the SCN trial in the middle of 2020 and data from the WM trial in the second half of 2020.

PIs are a group of more than 250 rare, chronic disorders in which flaws in the immune system cause increased susceptibility to infections and, in some cases, increased risk of cancers. Within this broad disease classification, a number of PIs are attributed to the improper trafficking of immune cells related to the CXCR4 receptor and its ligand CXCL12. Specifically, WHIM syndrome, one of these PIs, is caused by a mutation in the CXCR4 receptor that results in the receptor's signaling to remain "on" longer than normal. This excessive signaling immobilizes white blood cells, including neutrophils and lymphocytes, in the bone marrow where they are produced and dramatically reduces their ability to move into the blood and perform effective immunosurveillance. WHIM patients often have chronic neutropenia and lymphopenia (abnormally low neutrophils or lymphocytes, respectively) along with increased susceptibility to infections and certain cancers. We sponsored a preliminary independent market research study conducted by a third-party research firm that surveyed 212 physicians in the United States, who reported that over 1,700 patients have either genetically confirmed or are highly suspected to have WHIM syndrome in the United States alone. Based on this study, we estimate there are more than 1,000 genetically confirmed WHIM patients in the United States. Currently, there are no approved therapies for the treatment of WHIM syndrome and care is limited to the symptomatic treatment of the different manifestations of this disease.

Mavorixafor, our lead product candidate, is a potentially first-in-class, oral, allosteric antagonist of the CXCR4 receptor designed to correct the abnormal signaling caused by the receptor/ligand interaction and enable mobilization and trafficking of immune cells. Mavorixafor has completed an open-label, dose escalation Phase 2 clinical trial in patients with WHIM syndrome. In the Phase 2 trial, we observed that mavorixafor increased neutrophil and lymphocyte counts and was associated with

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improvement in certain signs and symptoms of WHIM syndrome. The increase in absolute neutrophil counts, or ANCs, was observed in the seven evaluable patients in the trial, with five of seven patients (71%) exceeding the pre-defined target threshold of 600/ μ L for ANCs. Similarly, we observed that mavorixafor increased absolute lymphocyte counts, or ALCs, with six of seven patients (86%) exceeding the pre-defined target threshold of 1,000/ μ L for ALCs. These thresholds of 600/ μ L for ANCs and 1,000/ μ L for ALCs correspond to the National Cancer Institute's adverse event grading system, which lists ANCs below 500/ μ L to be severe or life threatening and ALCs of 1,000/ μ L within the range of healthy individuals. In the Phase 2 trial, mavorixafor was not associated with any treatment-related serious adverse events and was observed to be well tolerated in daily doses of up to 400 mg for durations of up to 400 days. Additionally, patients experienced improved infection rates, as reported by patients and the trial investigators. Significant and visible reductions in wart lesions were also reported in a patient with a history of untreatable severe wart lesions. To date, over 150 patients in clinical trials have been dosed with mavorixafor, which has demonstrated a favorable tolerability profile. Based on the clinical data generated to date and our discussions with the U.S. Food and Drug Administration, or FDA, we have finalized the clinical trial protocol for our Phase 3 pivotal clinical trial of mavorixafor for the treatment of patients with WHIM syndrome and expect to commence the clinical trial in the second quarter of 2019 and report top-line data in 2021.

We believe that mavorixafor's approach through antagonism of the CXCR4 receptor has been validated by the FDA-approved product plerixafor for injection (marketed as Mozobil). Plerixafor is a CXCR4 antagonist that has been shown to induce white blood cell mobilization and is used for short-term treatment in preparation for stem-cell transplants. In a published investigator-sponsored pilot study of WHIM patients, twice-daily injections of plerixafor demonstrated increased white blood cell counts, including ANCs and ALCs, and reduced infections and wart lesions. We believe that this data validates CXCR4 antagonism as a mechanism of action for treating WHIM syndrome. However, plerixafor is not approved for the treatment of WHIM syndrome and we are not aware of any plans to develop it as a treatment for WHIM syndrome. In addition, plerixafor is only available in injectable form and its use is limited to four days of treatment. We believe that mavorixafor, which is being developed as an oral, once-daily treatment, has the potential to provide less invasive dosing and better patient compliance for life-long use in WHIM patients.

In addition to our initial focus on WHIM syndrome, we believe that the biological rationale and available data on mavorixafor support potential therapeutic benefits across a broad range of PIs, including SCN, and certain lymphomas, such as WM. SCN is a rare blood disorder that is characterized by abnormally low levels of certain white blood cells and has an estimated prevalence of approximately 2,000 to 3,000 persons in the United States and European Union. WM is a rare form of non-Hodgkin's lymphoma, which has an estimated prevalence of over 13,000 persons in the United States and European Union, at annual incidence rates of 1,000 to 1,500 in the United States and approximately 1,800 in the European Union. We plan to initiate a Phase 1 clinical trial of mavorixafor in SCN and a Phase 1/2 clinical trial of mavorixafor in WM in 2019. We expect to report data from the SCN trial in the middle of 2020 and data from the WM trial in the second half of 2020. We are also currently assessing mavorixafor in the Phase 2a portion of an open-label Phase 1/2 clinical trial for the treatment of patients with clear cell renal cell carcinoma, or ccRCC, in combination with axitinib, an FDA approved small molecule tyrosine kinase inhibitor. Final data from this trial is expected in the second half of 2019. We intend to pursue a strategic collaboration for future development and potential commercialization of mavorixafor in ccRCC and potentially other immuno-oncology indications.

We are also developing X4P-002, a CXCR4 antagonist that has unique properties that we believe will enable it to penetrate the blood-brain barrier and provide appropriate therapeutic exposures to treat brain cancers, including glioblastoma multiforme, or GBM. We are also developing X4P-003, a second

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generation molecule designed to have an enhanced pharmacokinetic profile relative to mavoxixafor, potentially enabling improved patient compliance and ease of use to better serve patients suffering from chronic rare diseases. Both of these programs are in preclinical development.

Our leadership team has considerable experience with research, development and commercialization of therapies to treat rare diseases, including therapies that target chemokine pathways. Paula Ragan, Ph.D., our founding Chief Executive Officer, previously held leadership roles at Genzyme, a Sanofi company. Dr. Ragan led the licensing of the CXCR4 antagonist portfolio from Genzyme and coordinated all phases of the transfer of the knowledge and know-how needed to launch our company. Our co-founder, Renato Skerlj, Ph.D., is an inventor of plerixafor, the only FDA-approved CXCR4 antagonist (for injection only) as well as ertapenem, an anti-bacterial approved by the FDA in 2001. Two members of our Board of Directors also have deep roots in our differentiated chemokine approach, including Gary J. Bridger, Ph.D., who was responsible for the discovery and development of plerixafor as a co-founder and Chief Scientific Officer of AnorMED Inc., until the company's acquisition by Genzyme in 2006, and Michael S. Wyzga, Chairman of our Board of Directors, who was the Chief Financial Officer of Genzyme during the approval, global launch and subsequent commercialization of plerixafor. We believe the experience of our leadership team provides our company with unique insights into product development and commercialization processes and the identification of other opportunities involving CXCR4 biology.

In October 2018, we received Orphan Drug Designation from the FDA for mavoxixafor for the treatment of WHIM syndrome. If mavoxixafor is approved for WHIM syndrome, this would provide mavoxixafor with up to seven years of market exclusivity for this indication. As of March 15, 2019, we owned or exclusively licensed 12 issued U.S. patents, 10 pending U.S. non-provisional patent applications, five pending U.S. provisional patent applications and approximately 120 PCT and foreign patents and patent applications. We have exclusively licensed a portfolio of patents and patent applications that includes claims to mavoxixafor-related molecules, including a granted U.S. patent with composition of matter claims to the new chemical entity defining mavoxixafor. This patent is expected to expire in December 2022, excluding possible patent extensions of up to five years. Additionally, we have filed several patent applications for our wholly owned intellectual property portfolio, which includes additional composition of matter claims for our mavoxixafor product formulation. If granted, these patent filings are expected to expire in 2036 and beyond.

Our Product Candidates

We are developing a pipeline of first-in-class, oral, small molecule CXCR4 antagonists with the potential to address a broad range of rare diseases, including PIs and cancers. Our product candidates are based on a single novel mechanism of allosteric inhibition of the CXCR4 receptor and are designed to have an improved pharmacological profile. The following table summarizes key information about our product candidates. We have retained worldwide clinical development and commercialization rights for the product candidates identified below.

Product Candidate	Indication	Stage of Development			
		Preclinical	Phase 1	Phase 2	Phase 3
	Warts, Hypogammaglobulinemia, Infections and Myelokathexis (WHIM) syndrome	Phase 2/3			
Mavorixafor (X4P-001)	Severe Congenital Neutropenia (SCN)	Phase 1			
	Waldenström's Macroglobulinemia (WM)	Phase 1/2			
	Clear cell renal cell carcinoma* (ccRCC) (Combination with Inlyta®)	Phase 2a			
X4P-002	Glioblastoma multiforme (GBM)				
X4P-003	Primary immuno-deficiencies (PID)				

* Two oncology trials have concluded: P1b biomarker in melanoma and P1b in ccRCC. Final publications expected in 2H19
 * Intend to enter into a strategic partnership for future development and potential commercialization for mavorixafor for ccRCC and other potential immuno-oncology indications

Our Strategy

Our goal is to discover, develop and commercialize novel therapeutics, based on established CXCR4 biology, for the treatment of rare diseases, including a broad range of PIs and cancer. The key tenets of our business strategy to achieve this goal include:

- **Advance our lead rare disease program through pivotal clinical development in WHIM syndrome.** We have completed a Phase 2 clinical trial of mavorixafor in patients with WHIM syndrome. In the completed Phase 2 trial, we achieved clinical proof-of-concept for mavorixafor in WHIM syndrome, observing a clinically meaningful increase in neutrophil and lymphocyte counts and a favorable tolerability profile. Based on clinical data to date and our discussions with the FDA, we plan to initiate the Phase 3 pivotal clinical trial in the second quarter of 2019 and expect to report top-line data from the trial in 2021.
- **Drive community awareness of and support for WHIM syndrome and build patient registries.** We are highly focused on our efforts to help build awareness of underserved serious rare diseases, such as WHIM syndrome, among patients, physicians and their support systems. Based on the preliminary independent market research study that we sponsored, we believe that there are more than 1,000 genetically confirmed WHIM patients in the United States. In addition to our sponsored market research and outreach efforts, we have partnered with key patient foundations and registries, including the Jeffrey Modell Foundation, University of Washington, Immune Deficiency

Foundation and Hopitaux Universitaires Est Parisien (Trousseau La Roche-Guyon), with the objective of increasing awareness of WHIM syndrome and improving patient diagnosis. In April 2018, we initiated a 300 patient prospective screening study, in collaboration with the Jeffrey Modell Foundation, to establish a systematic diagnostic approach for WHIM syndrome and to support the identification of WHIM patients by combining clinical features and genetic testing. To supplement these efforts, we have also deployed a field force of Medical Science Liaisons, or MSLs, in the United States to further drive education and awareness of WHIM syndrome. We plan to leverage our relationship with our partner organizations and patient registries to provide us with access to patients for clinical trial enrollment, which we believe will provide us with a significant advantage in rare disease drug development where patients are often hard to locate and recruit.

- **Advance additional indications for mavorixafor.** Our goal is to maximize the commercial potential of mavorixafor. Given aberrant functioning of the CXCR4 receptor is implicated in a variety of PIs, we believe mavorixafor has the potential to offer therapeutic benefits to patients suffering from certain of the 250 already defined PIs beyond WHIM syndrome. The next PI on which we believe mavorixafor can have a meaningful therapeutic effect is SCN and we intend to initiate a Phase 1 trial of mavorixafor in SCN in 2019. We believe mavorixafor may also have the potential to treat certain blood cancers, including WM, where regulation of the CXCR4 receptor has been shown to play a key role in treatment resistance and cancer progression. We intend to initiate a Phase 1/2 trial of mavorixafor in WM in 2019.
- **Advance earlier-stage product candidates and leverage insights into CXCR4 biology to further expand our pipeline.** Our second product candidate, X4P-002, is currently in preclinical development and is designed to selectively antagonize CXCR4. In preclinical studies, we have observed that X4P-002 has the ability to penetrate the blood-brain barrier and we believe X4P-002 has the potential to provide appropriate therapeutic exposures for GBM. Our third product candidate, X4P-003, is currently in preclinical development and is a second generation peripherally acting CXCR4 antagonist, with an enhanced pharmacokinetic profile relative to mavorixafor. We believe that these improved properties could allow X4P-003 to enable improved patient compliance and ease of use to better serve patients suffering from chronic rare diseases. We intend to leverage our insights into CXCR4 biology and our research capabilities to discover and develop additional product candidates with potential to offer meaningful clinical benefit.
- **Independently commercialize our product candidates in certain indications and geographies where we believe we can maximize value.** Given the potential of our product candidates to treat a wide variety of diseases, we believe that it will be important to maintain discipline with respect to our development and commercialization efforts. We plan to independently develop product candidates in indications, including rare diseases, where that we believe there is a well-defined clinical and regulatory approval pathway and that we believe we can commercialize those product candidates successfully, if approved. In addition, we may seek to enter into strategic collaborations around product candidates, disease areas or geographies that we believe could benefit from the resources of either larger biopharmaceutical companies or those specialized in a particular area of relevance.
- **Seek strategic collaborations for mavorixafor in immuno-oncology indications.** We intend to pursue strategic collaborations for future development and potential commercialization of mavorixafor in immuno-oncology indications in order to maximize the value of that asset while we maintain our focus on developing mavorixafor for rare diseases. Given what we believe is the significant potential of mavorixafor in immuno-oncology, we believe future development and potential commercialization is better served by the resources of larger biopharmaceutical companies. We are currently assessing mavorixafor in the Phase 2a portion of an open-label Phase 1/2 clinical trial for the treatment of patients with ccRCC in combination with axitinib. Previously, we reported interim data from our Phase 1b melanoma clinical trial in which we observed single-agent activity in the tumor microenvironment, or TME, with meaningful increases in CD8+ T-cells.

Risks Relating to Our Business

We are a biopharmaceutical company, and our business and ability to execute our business strategy are subject to a number of significant risks of which you should be aware before you decide to buy our securities. Among these important risks are the following:

- We have incurred significant losses since our inception. We expect to continue to incur losses and may never generate profits from operations or maintain profitability.
- Our limited operating history may make it difficult for you to evaluate the success of our business to date and to assess our future viability.
- We will require substantial additional funding. If we are unable to raise capital when needed, we could be forced to delay, reduce or eliminate any product development programs or commercialization efforts.
- The independent registered public accounting firm of X4 Therapeutics, Inc. (formerly X4 Pharmaceuticals, Inc. and our now wholly owned subsidiary), or X4, has included an explanatory paragraph relating to X4's ability to continue as a going concern in its report on X4's audited financial statements for the year ended December 31, 2018.
- Raising additional capital may cause dilution to our investors, restrict our operations or require us to relinquish rights to our technologies or product candidates. Future debt obligations may expose us to risks that could adversely affect our business, operating results and financial condition and may result in further dilution to our stockholders.
- We have not generated any revenues since inception and may never become profitable.
- We depend almost entirely on the success of our lead product candidate, mavorixafor, which we are developing initially for the treatment of WHIM syndrome, for the treatment of SCN, for the treatment of WM and for the treatment of ccRCC. We cannot be certain that we will be able to obtain regulatory approval for, or successfully commercialize, mavorixafor or any other product candidate.
- Our lead product candidate, mavorixafor, is only part way through the clinical trials we anticipate needing to complete before we may be able to submit an NDA to the FDA. Clinical drug development involves a lengthy and expensive process with an uncertain outcome, and results of early studies and trials may not be predictive of later trial results.
- Delays in our clinical trials may lead to a delay in the submission of our marketing approval application and jeopardize our ability to potentially receive approvals and generate revenues from the sale of our products.
- We may fail to enroll a sufficient number of patients in our clinical trials in a timely manner, which could delay or prevent clinical trials of our product candidates.
- We depend on license agreements with Genzyme, Beth Israel Deaconess Medical Center and Georgetown University to permit us to use patents and patent applications. Termination of these rights or the failure to comply with obligations under these agreements could materially harm our business and prevent us from developing or commercializing our product candidates.
- If the commercial opportunity in WHIM syndrome is smaller than we anticipate, our potential future revenue from mavorixafor for the treatment of WHIM syndrome may be adversely affected and our business may suffer.
- If we are unable to establish sales and marketing capabilities to market and sell our product candidates, we may be unable to generate any revenue.
- If, in the future, we are unable to establish sales and marketing capabilities or to selectively enter into agreements with third parties to sell and market our product candidates, we may not be successful in commercializing our product candidates if and when they are approved.
- We face substantial competition, which may result in others discovering, developing or commercializing products before or more successfully than we do.

- Even if we are able to commercialize mavorixafor or any other product candidate that we develop, the product may become subject to unfavorable pricing regulations, third-party reimbursement practices or healthcare reform initiatives, which would harm our business.
- We have no experience manufacturing our product candidates on a large clinical or commercial scale and have no manufacturing facility. We are currently dependent on a single third party manufacturer for the manufacture of mavorixafor for the active pharmaceutical ingredient, or API, and a single manufacturer of mavorixafor finished drug product capsules, and if we experience problems with these third parties, the manufacturing of mavorixafor could be delayed, which could harm our results of operations.
- We rely on third-party CROs to conduct our preclinical studies and clinical trials. If these CROs do not successfully carry out their contractual duties or meet expected deadlines, we may not be able to obtain regulatory approval for or commercialize our product candidates and our business could be substantially harmed.
- We may seek to selectively establish collaborations, and, if we are unable to establish them on commercially reasonable terms, we may have to alter our development and commercialization plans.
- To the extent we enter into any collaborations, we may depend on such collaborations for the development and commercialization of our product candidates. If those collaborations are not successful, we may not be able to capitalize on the market potential of our product candidates.
- If we are unable to protect our intellectual property rights, our competitive position could be harmed.
- We may become involved in lawsuits to protect or enforce our intellectual property, which could be expensive, time consuming and unsuccessful.
- If we are not able to obtain, or if there are delays in obtaining, required regulatory approvals, we will not be able to commercialize, or will be delayed in commercializing, our product candidates, and our ability to generate revenue will be impaired.

For additional information about the risks we face, please see the information contained in or incorporated by reference under “Risk Factors” on page S-12 of this prospectus supplement and page 6 of the accompanying prospectus.

Recent Developments—Preliminary Cash Balance (unaudited)

We estimate that we had cash and cash equivalents of \$23.3 million as of March 31, 2019, which excludes restricted cash of \$0.7 million as of that date that is restricted as to use. As of April 30, 2019, \$4.6 million of our available cash and cash equivalents will become restricted as to use in connection with our outstanding long-term debt and will become restricted cash.

Our actual consolidated financial results as of and for the three months ended March 31, 2019 are not yet available. Our financial closing procedures for the three months ended March 31, 2019 are not yet completed and, as a result, our final results upon completion of those procedures may differ materially from our preliminary estimates. The preliminary consolidated financial data presented above as of March 31, 2019 is not a comprehensive statement of our financial position or operating results; reflects our preliminary estimates based on information available as of the date of this prospectus supplement; and is subject to change, and those changes may be material. Accordingly, you should not place undue reliance upon these preliminary estimates.

This preliminary consolidated financial data has been prepared by, and is the responsibility of, our management. PricewaterhouseCoopers LLP has not audited, reviewed, compiled or applied agreed-upon procedures with respect to this preliminary consolidated financial data. Accordingly, PricewaterhouseCoopers LLP does not express an opinion or any other form of assurance with respect thereto.

Corporate Information

Prior to March 13, 2019, we were a clinical-stage biopharmaceutical company known as Arsanis, Inc. that had historically been focused on applying monoclonal antibody immunotherapies to address serious infectious diseases. Arsanis was originally incorporated in the State of Delaware in August 2010.

On March 13, 2019, we completed our business combination with X4 in accordance with the terms of an Agreement and Plan of Merger, dated as of November 26, 2018, as amended on December 20, 2018 and March 8, 2019, or the Merger Agreement, that we entered into with X4 and Artemis AC Corp., a Delaware corporation and our wholly owned subsidiary, or Merger Sub. Pursuant to the terms of the Merger Agreement, Merger Sub merged with and into X4, with X4 continuing as our wholly owned subsidiary and the surviving corporation of the merger, which we refer to as the Merger. At the closing of the Merger, we issued shares of our common stock to X4 stockholders based on an agreed upon exchange ratio, and each option or warrant to purchase X4 capital stock became an option or warrant, respectively, to purchase our common stock, subject to adjustment in accordance with the agreed upon exchange ratio. Following the closing of the Merger, we effected a 6-for-1 reverse stock split of our common stock, or the Reverse Stock Split, our name was changed to X4 Pharmaceuticals, Inc., the business of X4 became our business, and we became a clinical-stage biopharmaceutical company focused on the discovery, development and commercialization of novel therapeutics for the treatment of rare diseases. In connection with the closing of the Merger, our stock began trading on the Nasdaq Capital Market under the symbol "XFOR" on March 14, 2019.

Our corporate headquarters are located at 955 Massachusetts Avenue, 4th Floor, Cambridge, Massachusetts 02139 and our telephone number is (857) 529-8300. We also have an office in Vienna, Austria. We maintain a website at www.x4pharma.com, to which we regularly post copies of our press releases as well as additional information about us. The information contained on, or that can be accessed through, our website is not a part of this prospectus supplement or the accompanying prospectus. We have included our website address in this prospectus supplement solely as an inactive textual reference.

Our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and all amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, are available free of charge through the investor relations page of our internet website as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC.

All brand names or trademarks appearing in this prospectus supplement and the accompanying prospectus are the property of their respective holders. Use or display by us of other parties' trademarks, trade dress, or products in this prospectus supplement and the accompanying prospectus is not intended to, and does not, imply a relationship with, or endorsements or sponsorship of, us by the trademark or trade dress owners.

THE OFFERING

Common stock offered by us pursuant to this prospectus supplement	5,670,000 shares of common stock. This prospectus supplement also relates to the offering of the shares of our common stock issuable upon exercise of the Warrants, as discussed below.
Pre-Funded Warrants offered by us pursuant to this prospectus supplement	Pre-Funded Warrants to purchase 2,130,000 shares of common stock. Each Pre-Funded Warrant will have an exercise price per share of common stock equal to \$0.001 per share. The Pre-Funded Warrants are exercisable at any time after their original issuance and will not expire. Under the Pre-Funded Warrants, we may not effect the exercise of any Pre-Funded Warrant, and a holder will not be entitled to exercise any portion of any Pre-Funded Warrant, which, upon giving effect to such exercise, would cause (i) the aggregate number of shares of our common stock beneficially owned by the holder (together with its affiliates) to exceed 9.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise, or (ii) the combined voting power of our securities beneficially owned by the holder (together with its affiliates) to exceed 9.99% of the combined voting power of all of our securities then outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Pre-Funded Warrants. However, any holder may increase or decrease such percentage to any other percentage not in excess of 19.99% (if exceeding such percentage would result in a change of control under Nasdaq Listing Rule 5636(b) or any successor rule) upon at least 61 days' prior notice from the holder to us subject to the terms of the Pre-Funded Warrants. This prospectus supplement also relates to the offering of the shares of our common stock issuable upon exercise of the Pre-Funded Warrants.
Class A Warrants offered by us pursuant to this prospectus supplement	Class A Warrants to purchase 3,900,000 shares of common stock. Each Class A Warrant will have an exercise price per share of common stock equal to \$13.20 and will expire 60 months from the date of issuance. Each Class A Warrant will be immediately exercisable, provided that the holder will be prohibited, subject to certain exceptions, from

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	<p>exercising the Class A Warrant for shares of our common stock to the extent that immediately prior to or after giving effect to such exercise, the holder, together with its affiliates and other attribution parties, would own more than 9.99% of the total number of shares of our common stock then issued and outstanding, which percentage may be changed at the holders' election to a higher or lower percentage not in excess of 19.99% (if exceeding such percentage would result in a change of control under Nasdaq Listing Rule 5636(b) or any successor rule) upon 61 days' notice to us subject to the terms of the Class A Warrants. This prospectus supplement also relates to the offering of the shares of our common stock issuable upon exercise of the Class A Warrants.</p>
Common stock outstanding immediately after this offering	12,389,684 shares of common stock, assuming no exercise of the Warrants included in this offering.
Offering price	\$11.00 per share of common stock and accompanying Class A Warrants (or, for Pre-Funded Warrants in lieu of common stock, \$10.999 per Pre-Funded Warrant and accompanying Class A Warrants).
Use of proceeds	<p>We estimate that the net proceeds from this offering will be approximately \$78.9 million, after deducting underwriting discounts and estimated offering expenses payable by us. This estimate excludes the proceeds, if any, from the exercise of the Warrants sold in this offering.</p> <p>We intend to use substantially all of the net proceeds from this offering: (i) to fund the Phase 3 pivotal clinical trial of mavorixafor in patients with Warts, Hypogammaglobulinemia, Infections, and Myelokathexis, or WHIM, syndrome; (ii) to initiate a Phase 1 trial of mavorixafor in severe congenital neutropenia, or SCN; (iii) to initiate a Phase 1/2 trial of mavorixafor in Waldenström macroglobulinemia, or WM; (iv) to initiate and/or fund other preclinical programs; and (v) for general and administrative expenses, capital expenditures, working capital and other general corporate purposes. See "Use of Proceeds" on page S-16 of this prospectus supplement for a more complete description of the intended use of proceeds from this offering.</p>

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Risk factors

An investment in our securities involves a high degree of risk.

See the information contained in or incorporated by reference under "Risk Factors" on page S-12 of this prospectus supplement, as well as the other information included in or incorporated by reference in this prospectus supplement and the accompanying prospectus.

Nasdaq Capital Market symbol

Our common stock is listed on the Nasdaq Capital Market under the symbol "XFOR." There is no established public trading market for the Warrants, and we do not expect a market to develop. We do not intend to apply for listing of the Warrants on any securities exchange or other nationally recognized trading system. Without an active trading market, the liquidity of the Warrants will be limited. See "Description of Securities We Are Offering" for additional information.

The number of shares of our common stock to be outstanding after this offering is based on an aggregate of 6,719,684 shares of our common stock outstanding as of March 13, 2019 and excludes:

- 1,082,874 shares of our common stock issuable upon the exercise of stock options outstanding under the 2015 Employee, Director and Consultant Equity Incentive Plan, as amended, or the X4 Plan, the 2017 Equity Incentive Plan, or the Arsanis Plan, the 2010 Special Stock Incentive Plan, as amended, or the 2010 Plan, and the 2011 Stock Incentive Plan, as amended, or the 2011 Plan, as of March 13, 2019, at a weighted average exercise price of \$23.50 per share, of which 578,925 shares were vested as of such date;
- 495,690 shares of our common stock issuable upon the exercise of warrants outstanding as of March 13, 2019, at a weighted average exercise price of \$20.66 per share;
- 180,996 shares of our common stock reserved for future issuance under the X4 Plan and 148,529 shares of common stock reserved for future issuance under the Arsanis Plan, plus up to an additional 249,643 shares that are represented by outstanding stock options granted under the 2010 Plan and the 2011 Plan as of March 13, 2019, which may be issued solely after the expiration or other surrender, cancelation, forfeiture or repurchase of such stock options;
- 85,092 shares of our common stock reserved for future issuance under the 2017 Employee Stock Purchase Plan, or ESPP, as of March 13, 2019; and
- 2,130,000 shares of our common stock issuable upon the exercise of the Pre-Funded Warrants and 3,900,000 shares of our common stock issuable upon the exercise of the Class A Warrants being offered by us in this offering.

Except as otherwise indicated, all share and per share amounts included in this prospectus supplement reflect the issuance of shares of common stock in the Merger and the Reverse Stock Split and assume no exercise of outstanding stock options or warrants, each as described above, and no exercise of the Warrants included in this offering.

RISK FACTORS

You should consider carefully the risks described below and discussed in the section titled "Risk Factors" contained in our Annual Report on Form 10-K for the year ended December 31, 2018, as updated by our subsequent filings under the Exchange Act, each of which is incorporated by reference in this prospectus supplement and the accompanying prospectus in their entirety, together with other information in this prospectus supplement and the accompanying prospectus, and the information and documents incorporated by reference in this prospectus supplement and the accompanying prospectus, and any free writing prospectus that we have authorized for use in connection with this offering before you make a decision to invest in our securities. If any of the following events actually occur, our business, financial condition, results of operations or cash flow could be harmed. This could cause the trading price of our common stock (including the common stock issuable upon exercise of the Warrants issued in this offering) to decline and you may lose all or part of your investment. The risks below and incorporated by reference in this prospectus supplement and the accompanying prospectus are not the only ones we face. Additional risks not currently known to us or that we currently deem immaterial may also affect our business operations. Please also read carefully the section below titled "Special Note Regarding Forward-Looking Statements."

Risks Related to this Offering

If you purchase securities in this offering, you will suffer immediate dilution of your investment.

The public offering price per share of our common stock and the accompanying Class A Warrants (or, in the case of Pre-Funded Warrants and accompanying Class A Warrants, the public offering price per share of our common stock and the accompanying Class A Warrants, minus \$0.001) is substantially higher than the pro forma as adjusted net tangible book value per share of our common stock after giving effect to this offering. Therefore, if you purchase securities in this offering, you will pay an effective price per share of common stock that substantially exceeds our pro forma as adjusted net tangible book value per share after giving effect to this offering. If you purchase securities in this offering, assuming no exercise of the Warrants offered in this offering and that such Warrants are classified and accounted for as stockholders' equity, you will experience immediate and substantial dilution in pro forma as adjusted net tangible book value of \$4.03 per share, representing the difference between our pro forma as adjusted net tangible book value after giving effect to this offering and the public offering price per share of common stock or Pre-Funded Warrant and the accompanying Class A Warrants. In the event Warrants are exercised by holders, you will experience additional dilution to the extent that the exercise price of those Warrants is higher than the book value per share of our common stock. Furthermore, if (i) previously issued options and warrants to acquire common stock are exercised at prices below the public offering price of our common stock or Pre-Funded Warrant and the accompanying Class A Warrants or (ii) the Warrants are determined to be accounted for as liabilities, you will experience further dilution. For a further description of the dilution you will experience immediately after this offering, see "Dilution."

There is no public market for the Warrants being offered by us in this offering.

There is no established public trading market for the Warrants being offered in this offering, and we do not expect a market to develop. In addition, we do not intend to apply to list the Warrants on any national securities exchange or other nationally recognized trading system, including the Nasdaq Capital Market. Without an active market, the liquidity of the Warrants will be limited.

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Except as otherwise provided in the Pre-Funded Warrants and Class A Warrants, holders of each of the Pre-Funded Warrants and Class A Warrants purchased in this offering will have no rights as common stockholders until such holders exercise their Warrants and acquire our common stock.

Until holders of Pre-Funded Warrants and Class A Warrants acquire shares of our common stock upon exercise thereof, except as otherwise provided in each of the Pre-Funded Warrants and Class A Warrants, such holders will have no rights with respect to the shares of our common stock underlying such Warrants. Upon exercise of the Pre-Funded Warrants and Class A Warrants, the holders will be entitled to exercise the rights of a common stockholder only as to matters for which the record date occurs after the exercise date.

The Warrants are speculative in nature.

The Warrants do not confer any rights of common stock ownership on their holders, such as voting rights or the right to receive dividends, but rather merely represent the right to acquire shares of common stock at a fixed price for a limited period of time. Specifically, commencing on the date of issuance, holders of the Pre-Funded Warrants may exercise their right to acquire the common stock and pay an exercise price per share equal to \$0.001, subject to certain adjustments, and holders of the Class A Warrants may exercise their right to acquire the common stock and pay an exercise price per share equal to \$13.20, subject to certain adjustments, without expiration in the case of Pre-Funded Warrants and prior to 60 months from the date of issuance in the case of Class A Warrants, after which date any unexercised Class A Warrants will expire and have no further value. Moreover, following this offering, the market value of the Warrants, if any, is uncertain and there can be no assurance that the market value of the Warrants will equal or exceed their imputed offering price. The Warrants will not be listed or quoted for trading on any market or exchange. There can be no assurance that the market price of the common stock will ever equal or exceed the respective exercise prices of the Warrants, and consequently, it may not ever be profitable for holders of the Warrants to exercise the Warrants.

Our management will have broad discretion over the use of the net proceeds from this offering, and you may not agree with how we use the proceeds and the proceeds may not be invested successfully.

Our management will have broad discretion as to the use of the net proceeds from this offering and could use them for purposes other than those contemplated at the time of this offering. Accordingly, you are relying on the judgment of our management with regard to the use of these net proceeds, and you will not have the opportunity, as part of your investment decision, to assess whether the proceeds will be used appropriately. It is possible that the proceeds will be invested in a way that does not yield a favorable, or any, return for us. For a further description of the planned use of net proceeds from this offering, see "Use of Proceeds."

Because we do not anticipate paying any cash dividends on our capital stock in the foreseeable future, capital appreciation, if any, will be your sole source of gain.

We have never paid or declared any cash dividends on our capital stock. We currently intend to retain earnings, if any, to finance the growth and development of our business and we do not anticipate paying any cash dividends in the foreseeable future. As a result, only appreciation of the price of our common stock will provide a return to our stockholders.

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Sales of a significant number of shares of our common stock in the public markets, or the perception that such sales could occur, could depress the market price of our common stock.

Sales of a substantial number of shares of our common stock in the public markets could depress the market price of our common stock and impair our ability to raise capital through the sale of additional equity securities. We, our directors and our executive officers have agreed not to sell, dispose of or hedge any common stock or securities convertible into or exchangeable for shares of common stock during the period from the date of this prospectus supplement continuing through and including the date 90 days after the date of this prospectus supplement, subject to certain exceptions. The underwriters may, in their discretion, release the restrictions on any such shares at any time without notice. We cannot predict the effect that future sales of our common stock would have on the market price of our common stock.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus supplement, the accompanying prospectus and the documents we have filed with the SEC that are incorporated by reference contain “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Exchange Act, that relate to future events or to our future operating or financial performance. Any forward-looking statement involves known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to differ materially from any future results, levels of activity, performance or achievements expressed or implied by such forward-looking statement. Forward-looking statements include statements, other than statements of historical fact, about, among other things:

- the progress, scope, cost, duration or results of our development activities, nonclinical studies and clinical trials of mavorixafor (X4P-001), X4P-002 and X4P-003 or any of our other product candidates or programs, such as the target indication(s) for development, the size, design, population, conduct, cost, objective or endpoints of any clinical trial, or the timing for initiation or completion of or availability of results from any clinical trial (including our planned trials for mavorixafor in WHIM syndrome, SCN and WM), for submission or approval of any regulatory filing or for meeting with regulatory authorities;
- the potential benefits that may be derived from any of our product candidates;
- the timing of and our ability to obtain and maintain regulatory approval of our existing product candidates, any product candidates that we may develop, and any related restrictions, limitations, or warnings in the label of any approved product candidates;
- our future operations, financial position, revenues, costs, expenses, uses of cash, capital requirements or our need for additional financing;
- our use of proceeds from this offering; and
- our strategies, prospects, plans, expectations or objectives.

Words such as, but not limited to, “believe,” “expect,” “anticipate,” “estimate,” “forecast,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “targets,” “likely,” “will,” “would,” “could,” “should,” “continue,” “scheduled” and similar expressions or phrases, or the negative of those expressions or phrases, are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus supplement, we caution you that these statements are based on our projections of the future that are subject to known and unknown risks and uncertainties and other important factors that may cause our actual results, level of activity, performance or achievements expressed or implied by any forward-looking statement to differ. These risks, uncertainties and other factors are described in greater detail under the caption “Risk Factors” beginning on page S-12 of this prospectus supplement, page 6 of the accompanying prospectus and in the documents incorporated by reference into this prospectus supplement and the accompanying prospectus. Also, these forward-looking statements represent our estimates and assumptions only as of the date of the document containing the applicable statement. As a result of the risks and uncertainties, the results or events indicated by the forward-looking statements may not occur. We caution you not to place undue reliance on any forward-looking statement.

You should read this prospectus supplement, the accompanying prospectus and the documents we have filed with the SEC that are incorporated by reference completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in the foregoing documents by these cautionary statements. Unless required by law, we undertake no obligation to update or revise any forward-looking statements to reflect new information or future events or developments. Thus, you should not assume that our silence over time means that actual events are bearing out as expressed or implied in such forward-looking statements.

USE OF PROCEEDS

We estimate that the net proceeds we will receive from the issuance and sale of shares of our common stock (or Pre-Funded Warrants to purchase shares of our common stock) and accompanying Class A Warrants in this offering will be approximately \$78.9 million, after deducting underwriting discounts and estimated offering expenses payable by us. This estimate excludes the proceeds, if any, from the exercise of the Warrants sold in this offering.

We currently estimate that we will use the net proceeds from this offering:

- to fund the Phase 3 pivotal clinical trial of mavorixafor in patients with WHIM syndrome;
- to initiate a Phase 1 trial of mavorixafor in SCN;
- to initiate a Phase 1/2 trial of mavorixafor in WM;
- to initiate and/or fund other preclinical programs; and
- for general and administrative expenses, capital expenditures, working capital and other general corporate purposes.

We believe that the net proceeds from this offering, together with our existing cash and cash equivalents, will be sufficient to fund our operating expenses, capital expenditure requirements and debt service payments through at least the end of 2021.

Our expected use of the net proceeds from this offering represents our current intentions based upon our present plans and business conditions. The amounts and timing of our actual use of net proceeds will vary depending on numerous factors, including the relative success and cost of our research, preclinical and clinical development programs, whether we are able to enter into future collaborations, and any unforeseen delays or cash needs. As a result, our management will have broad discretion in the application of the net proceeds, and investors will be relying on our judgment regarding the application of the net proceeds of this offering. In addition, we might decide to postpone or not pursue these planned trials and activities or other development activities if the net proceeds from this offering and the other sources of cash are less than, or do not last as long as, expected.

Pending their use, we plan to invest the net proceeds from this offering in short- and intermediate-term, interest-bearing obligations, investment-grade instruments, certificates of deposit or direct or guaranteed obligations of the U.S. government.

If all of the Pre-Funded Warrants sold in this offering were to be exercised in cash at an exercise price per share equal to \$0.001 and all of the Class A Warrants sold in this offering were to be exercised in cash at an exercise price per share equal to \$13.20, we would receive exercise proceeds of approximately \$51.5 million. We cannot predict when or if the Warrants will be exercised. It is possible that the Warrants may expire and may never be exercised.

CAPITALIZATION

The following table sets forth our cash and cash equivalents and our capitalization as of December 31, 2018:

- on an actual basis, without giving effect to the Reverse Stock Split;
- on a pro forma basis to give effect to the Merger, the Settlement Agreement (defined below) and the Reverse Stock Split; and
- on a pro forma as adjusted basis to give further effect to the issuance and sale of (i) 5,670,000 shares of our common stock and accompanying Class A Warrants to purchase 2,835,000 shares of our common stock in this offering at a public offering price of \$11.00 per share of common stock and the accompanying Class A Warrants, and (ii) Pre-Funded Warrants to purchase 2,130,000 shares of our common stock and accompanying Class A Warrants to purchase 1,065,000 shares of our common stock in this offering at the public offering price per share minus \$0.001, in each case after deducting underwriting discounts and estimated offering expenses payable by us, and assuming no exercise of the Warrants offered hereby and that such Warrants are classified and accounted for as stockholders' equity.

On March 8, 2019, Arsanis, Merger Sub, X4 and Arsanis Biosciences GmbH, or Arsanis GmbH, a wholly owned subsidiary of Arsanis, entered into a settlement agreement, or the Settlement Agreement, with Österreichische Forschungsförderungsgesellschaft GmbH, or 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.

We have not yet determined whether the Warrants will be classified and accounted for as liabilities or as stockholders' equity.

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This table should be read together with our consolidated financial statements and related notes and the other financial information included or incorporated by reference in this prospectus supplement and the accompanying prospectus.

	As of December 31, 2018		
	Actual	Pro Forma ⁽¹⁾	Pro Forma As Adjusted
	(In thousands, except share and per share data)		
Cash and cash equivalents	\$ 30,754	\$ 32,075	\$ 111,021
Long-term debt, net of discount, including current portion	\$ 7,894	\$ 17,832	\$ 17,832
Stockholders' equity:			
Common stock, \$0.001 par value per share; 200,000,000 shares authorized, 14,572,246 shares issued and outstanding, actual; 33,333,333 shares authorized, 6,719,684 shares issued and outstanding, pro forma; 33,333,333 shares authorized, 12,389,684 shares issued and outstanding, pro forma as adjusted	15	7	12
Additional paid-in capital	156,630	118,041	196,982
Accumulated other comprehensive income	241	—	—
Accumulated deficit	(135,286)	(81,856)	(81,856)
Total stockholders' equity	21,600	36,192	115,138
Total capitalization	\$ 29,494	\$ 54,024	\$ 132,970

(1) See Exhibit 99.2 of Amendment No. 1 to our Current Report on Form 8-K that we filed with the SEC on April 3, 2019 for details on the calculations of pro forma amounts. X4 was determined to be the accounting acquirer.

The number of shares of our common stock to be outstanding after this offering is based on an aggregate of 6,719,684 shares of our common stock outstanding as of December 31, 2018, pro forma, and excludes:

- 1,121,756 shares of our common stock issuable upon the exercise of stock options outstanding under the X4 Plan, the Arsanis Plan, the 2010 Plan and the 2011 Plan as of December 31, 2018, at a weighted average exercise price of \$23.46 per share, of which 475,694 shares were vested as of such date;
- 495,690 shares of our common stock issuable upon the exercise of warrants outstanding as of December 31, 2018, at a weighted average exercise price of \$20.66 per share;
- 158,999 shares of our common stock reserved for future issuance under the X4 Plan and 51,381 shares of common stock reserved for future issuance under the Arsanis Plan as of December 31, 2018, plus up to an additional 249,643 shares that are represented by outstanding stock options granted under the 2010 Plan and the 2011 Plan as of December 31, 2018, which may be issued solely after the expiration or other surrender, cancellation, forfeiture or repurchase of such stock options;
- 36,519 shares of our common stock reserved for future issuance under the ESPP as of December 31, 2018; and
- 2,130,000 shares of our common stock issuable upon the exercise of the Pre-Funded Warrants and 3,900,000 shares of our common stock issuable upon the exercise of the Class A Warrants being offered by us in this offering.

DILUTION

If you invest in our common stock (or, in lieu of common stock, Pre-Funded Warrants) and accompanying Class A Warrants, your ownership interest will be diluted immediately to the extent of the difference between the offering price per share of our common stock or Pre-Funded Warrants and the accompanying Class A Warrants and the pro forma as adjusted net tangible book value per share of our common stock after this offering.

Our pro forma net tangible book value as of December 31, 2018 was \$7.4 million, or \$1.10 per share of common stock. Pro forma net tangible book value represents the amount of our total tangible assets less total liabilities, after giving effect to the Merger, the Settlement Agreement and the Reverse Stock Split. Pro forma net tangible book value per share represents pro forma net tangible book value divided by the number of outstanding shares of our common stock as of December 31, 2018, after giving effect to the pro forma adjustments described above. See Exhibit 99.2 of Amendment No. 1 to our Current Report on Form 8-K that we filed with the SEC on April 3, 2019 for details on the calculations of pro forma amounts. X4 was determined to be the accounting acquirer.

After giving further effect to our issuance and sale of (i) 5,670,000 shares of our common stock and accompanying Class A Warrants to purchase 2,835,000 shares of our common stock in this offering at a public offering price of \$11.00 per share of common stock and the accompanying Class A Warrants and (ii) Pre-Funded Warrants to purchase 2,130,000 shares of our common stock and accompanying Class A Warrants to purchase 1,065,000 shares of our common stock in this offering at the public offering price per share minus \$0.001, and in each case after deducting underwriting discounts and estimated offering expenses payable by us, and assuming no exercise of the Warrants offered hereby and that such Warrants are classified and accounted for as stockholders' equity, our pro forma as adjusted net tangible book value as of December 31, 2018 would have been \$86.3 million, or \$6.97 per share of common stock. This represents an immediate increase in pro forma as adjusted net tangible book value of \$5.87 per share of common stock to our existing stockholders and immediate dilution in pro forma as adjusted net tangible book value of \$4.03 per share of common stock to new investors purchasing common stock or Pre-Funded Warrants and the accompanying Class A Warrants in this offering. The pro forma as adjusted number of shares of common stock outstanding as of December 31, 2018 in the denominator of the calculation of pro forma as adjusted net tangible book value per share includes the 5,670,000 shares of our common stock sold in this offering but excludes the 2,130,000 shares of our common stock issuable upon the exercise of the Pre-Funded Warrants sold in this offering because such shares are not issued or outstanding unless and until the Pre-Funded Warrants are exercised. Dilution per share is calculated by subtracting pro forma as adjusted net tangible book value per share after this offering from the public offering price per share of common stock or Pre-Funded Warrant and the accompanying Class A Warrants.

The following table illustrates this dilution on a per share basis:

Public offering price per share of common stock or Pre-Funded Warrant and the accompanying Class A Warrants	\$ 11.00
Pro forma net tangible book value per share as of December 31, 2018	\$1.10
Increase in pro forma as adjusted net tangible book value per share attributable to new investors purchasing common stock or Pre-Funded Warrants and the accompanying Class A Warrants in this offering	<u>5.87</u>
Pro forma as adjusted net tangible book value per share after this offering	<u>6.97</u>
Dilution per share to new investors purchasing common stock or Pre-Funded Warrants and the accompanying Class A Warrants in this offering	<u>\$ 4.03</u>

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The above discussion and table are based on an aggregate of 6,719,684 shares of our common stock outstanding as of December 31, 2018, pro forma, and exclude:

- 1,121,756 shares of our common stock issuable upon the exercise of stock options outstanding under the X4 Plan, the Arsanis Plan, the 2010 Plan and the 2011 Plan as of December 31, 2018, at a weighted average exercise price of \$23.46 per share, of which 475,694 shares were vested as of such date;
- 495,690 shares of our common stock issuable upon the exercise of warrants outstanding as of December 31, 2018, at a weighted average exercise price of \$20.66 per share;
- 158,999 shares of our common stock reserved for future issuance under the X4 Plan and 51,381 shares of common stock reserved for future issuance under the Arsanis Plan as of December 31, 2018, plus up to an additional 249,643 shares that are represented by outstanding stock options granted under the 2010 Plan and the 2011 Plan as of December 31, 2018, which may be issued solely after the expiration or other surrender, cancelation, forfeiture or repurchase of such stock options;
- 36,519 shares of our common stock reserved for future issuance under the ESPP as of December 31, 2018; and
- 2,130,000 shares of our common stock issuable upon the exercise of the Pre-Funded Warrants and 3,900,000 shares of our common stock issuable upon the exercise of the Class A Warrants being offered by us in this offering.

We have not yet determined whether the Warrants will be classified and accounted for as liabilities or as stockholders' equity. To the extent that outstanding options or warrants are exercised, the Warrants issued in this offering are determined to be accounted for as liabilities or we otherwise issue additional shares of common stock or warrants in the future, you will experience further dilution. In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that additional capital is raised through the sale of equity or convertible debt securities, the issuance of these securities may result in further dilution to our stockholders.

DESCRIPTION OF SECURITIES WE ARE OFFERING

We are offering (i) 5,670,000 shares of our common stock, or, for certain investors that so choose, in lieu of common stock, Pre-Funded Warrants to purchase 2,130,000 shares of our common stock (ii) together with Class A Warrants to purchase 3,900,000 shares of our common stock. We are also registering the shares of common stock issuable from time to time upon exercise of Warrants offered hereby. The shares of common stock (or Pre-Funded Warrants) and accompanying Class A Warrants are immediately separable and will be issued separately.

Common Stock

Our authorized capital stock consists of 33,333,333 shares of common stock, par value \$0.001 per share, and 10,000,000 shares of preferred stock, par value \$0.001 per share, all of which preferred stock is undesignated. Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. Each election of directors by our stockholders will be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of outstanding preferred stock.

In the event of our liquidation or dissolution, the holders of our common stock are entitled to receive proportionately all assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any of our outstanding preferred stock. Holders of our common stock have no pre-emptive, subscription, redemption or conversion rights. The rights, preferences and privileges of holders of our common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of our preferred stock that we may designate and issue in the future.

Additional information regarding our capital stock, including a description of certain terms of our restated certificate of incorporation, as amended, and our amended and restated bylaws and applicable provisions of Delaware corporate law, is set forth under the caption "Description of Common Stock and Preferred Stock" starting on page 17 of the accompanying prospectus.

Pre-Funded Warrants

The following summary of certain terms and provisions of the Pre-Funded Warrants is not complete and is subject to, and qualified in its entirety by, the provisions of the Pre-Funded Warrants. Prospective investors should carefully review the terms and provisions of the form of Pre-Funded Warrant that is filed as an exhibit to the registration statement of which this prospectus supplement forms a part for a complete description of the terms and conditions of the Pre-Funded Warrants.

Form. The Pre-Funded Warrants will be issued as individual warrant agreements to the investors. The form of Pre-Funded Warrant will be filed as an exhibit to our Current Report on Form 8-K that we expect to file with the SEC on April 15, 2019.

Exercisability. The Pre-Funded Warrants are exercisable at any time after their original issuance. The Pre-Funded Warrants will be exercisable, at the option of each holder, in whole or in part by delivering to us a duly executed exercise notice and by payment in full in immediately available funds for the number of shares of common stock purchased upon such exercise. As an alternative to payment in immediately available funds, the holder may, in its sole discretion, elect to exercise the Pre-Funded Warrant through a cashless exercise, in which case the holder would receive upon such exercise the net number of shares of common stock determined according to the formula set forth in the Pre-Funded Warrant. No fractional shares of common stock will be issued in connection with the

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exercise of a Pre-Funded Warrant. In lieu of fractional shares, we will pay the holder an amount in cash equal to the fractional amount multiplied by the fair market value of any such fractional shares.

Exercise Limitations. Under the Pre-Funded Warrants, we may not effect the exercise of any Pre-Funded Warrant, and a holder will not be entitled to exercise any portion of any Pre-Funded Warrant, which, upon giving effect to such exercise, would cause (i) the aggregate number of shares of our common stock beneficially owned by the holder (together with its affiliates) to exceed 9.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise, or (ii) the combined voting power of our securities beneficially owned by the holder (together with its affiliates) to exceed 9.99% of the combined voting power of all of our securities then outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Pre-Funded Warrants. However, any holder may increase or decrease such percentage to any other percentage not in excess of 19.99% (if exceeding such percentage would result in a change of control under Nasdaq Listing Rule 5636(b) or any successor rule) upon at least 61 days' prior notice from the holder to us subject to the terms of the Pre-Funded Warrants.

Exercise Price. The exercise price per whole share of our common stock purchasable upon the exercise of the Pre-Funded Warrants is \$0.001 per share of common stock. The exercise price of the Pre-Funded Warrants is subject to appropriate adjustment in the event of certain stock dividends and distributions, stock splits, stock combinations, reclassifications or similar events affecting our common stock and also upon any distributions of assets, including cash, stock or other property to our stockholders.

Transferability. Subject to applicable laws, the Pre-Funded Warrants may be offered for sale, sold, transferred or assigned without our consent.

Exchange Listing. We do not plan on applying to list the Pre-Funded Warrants on The Nasdaq Capital Market, any other national securities exchange or any other nationally recognized trading system.

Fundamental Transactions. In the event of a fundamental transaction, as described in the Pre-Funded Warrants and generally including any reorganization, recapitalization or reclassification of our common stock, the sale, transfer or other disposition of all or substantially all of our properties or assets, our consolidation or merger with or into another person, the acquisition of more than 50% of our outstanding common stock, or any person or group becoming the beneficial owner of 50% of the voting power represented by our outstanding common stock, the holders of the Pre-Funded Warrants will be entitled to receive upon exercise of the Pre-Funded Warrants the kind and amount of securities, cash or other property that the holders would have received had they exercised the Pre-Funded Warrants immediately prior to such fundamental transaction without regard to any limitations on exercised contained in the Pre-Funded Warrants.

Rights as a Stockholder. Except for the right to participate in certain dividends and distributions and as otherwise provided in the Pre-Funded Warrants or by virtue of such holder's ownership of shares of our common stock, the holders of the Pre-Funded Warrants do not have the rights or privileges of holders of our common stock, including any voting rights, until they exercise their Pre-Funded Warrants.

Class A Warrants

The following summary of certain terms and provisions of the Class A Warrants is not complete and is subject to, and qualified in its entirety by, the provisions of the Class A Warrants. Prospective investors should carefully review the terms and provisions of the form of Class A Warrant that is filed as an exhibit to the registration statement of which this prospectus supplement forms a part for a complete description of the terms and conditions of the Class A Warrants.

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Duration and Exercise Price. Each Class A Warrant will have an initial exercise price per share equal to \$13.20. The Class A Warrants will be immediately exercisable and will expire 60 months from the date of issuance. The exercise price and number of shares of common stock issuable upon exercise is subject to appropriate adjustment in the event of stock dividends, stock splits, reorganizations or similar events affecting our common stock and the exercise price. The Class A Warrants will be issued separately from the common stock and the Pre-Funded Warrants included in this offering.

Cashless Exercise. In lieu of making the cash payment otherwise contemplated to be made to us upon such exercise in payment of the aggregate exercise price, the holder may elect instead to receive upon such exercise (either in whole or in part) the net number of shares of common stock determined according to a formula set forth in the Class A Warrants.

Exercisability. The Class A Warrants will be exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of our common stock purchased upon such exercise. A holder (together with its affiliates and other attribution parties) may not exercise any portion of a Class A Warrant to the extent that immediately prior to or after giving effect to such exercise the holder would own more than 9.99% of our outstanding common stock immediately after exercise, which percentage may be changed at the holder's election to a higher or lower percentage not in excess of 19.99% (if exceeding such percentage would result in a change of control under Nasdaq Listing Rule 5636(b) or any successor rule) upon 61 days' notice to us subject to the terms of the Class A Warrants.

Fractional Shares. No fractional shares of common stock will be issued upon the exercise of the Class A Warrants. Rather, the number of shares of common stock to be issued will be rounded to the nearest whole number.

Transferability. Subject to applicable laws, a Class A Warrant may be transferred at the option of the holder upon surrender of the Class A Warrant to us together with the appropriate instruments of transfer.

Exchange Listing. We do not intend to list the Class A Warrants on any securities exchange or nationally recognized trading system. The common stock issuable upon exercise of the Class A Warrants is currently listed on the Nasdaq Capital Market.

Rights as a Stockholder. Except for the right to participate in certain dividends and distributions and as otherwise provided in the Class A Warrants or by virtue of such holder's ownership of shares of our common stock, the holders of the Class A Warrants do not have the rights or privileges of holders of our common stock, including any voting rights, until they exercise their Class A Warrants.

Fundamental Transaction. In the event of a fundamental transaction, as described in the Class A Warrants and generally including our consolidation or merger with or into another person; the sale, assignment, transfer, conveyance or other disposition of all or substantially all of our assets in one transaction or a series of related transactions; any purchase, tender offer or exchange offer (whether by us or another person) or stock purchase or other business combination is completed pursuant to which more than 50% of the common stock not held by us or such person is exchanged for or converted into other securities, cash or property; any reorganization, recapitalization or reclassification of our common stock; or the acquisition of at least 50% of our outstanding common stock, the holders of the Class A Warrants will be entitled to receive upon exercise of the Class A Warrants the kind and amount of securities, cash or other property that the holders would have received had they exercised the Class A Warrants immediately prior to such fundamental transaction. In addition, in the event of a fundamental transaction which is approved by our board of directors that is also a change of control as

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defined in the Class A Warrants, the holders of the Class A Warrants have the right to require us or a successor entity to redeem the Class A Warrants for cash in the amount of the Black-Scholes value of the unexercised portion of the Class A Warrants on the date of the consummation of the fundamental transaction. In the event of a fundamental transaction which is not approved by our board of directors that is also a change of control as defined in the Class A Warrants, the holders of the Class A Warrants have the right to require us or a successor entity to redeem the Class A Warrants for the consideration paid in the fundamental transaction in the amount of the Black-Scholes value of the unexercised portion of the Class A Warrants on the date of the consummation of the fundamental transaction payable at our option in either shares of our common stock (or, in certain cases, in the securities of the successor entity) or cash.

Listing on the Nasdaq Capital Market

Our common stock is listed on the Nasdaq Capital Market under the trading symbol "XFOR." There is no established public trading market for the Warrants, and we do not expect a market to develop. We do not intend to list the Warrants on the Nasdaq Capital Market, any other national securities exchange or any other nationally recognized trading system.

Transfer Agent and Registrar

The transfer agent and registrar for shares of our common stock (including the underlying shares of common stock issuable upon exercise of the Warrants) is Computershare Trust Company, N.A.

Warrant Agents

We are the warrant agent for the Pre-Funded Warrants and our warrant agent for the Class A Warrants is Computershare Trust Company, N.A.

MATERIAL U.S. FEDERAL TAX CONSIDERATIONS FOR HOLDERS OF OUR COMMON STOCK AND WARRANTS

The following discussion describes the material U.S. federal income tax consequences of the acquisition, ownership and disposition of our common stock and Warrants acquired in this offering. This discussion is based on the current provisions of the Internal Revenue Code of 1986, as amended, referred to as the Code, existing and proposed U.S. Treasury regulations promulgated thereunder, and administrative rulings and court decisions in effect as of the date hereof, all of which are subject to change at any time, possibly with retroactive effect. No ruling has been or will be sought from the Internal Revenue Service, or IRS, with respect to the matters discussed below, and there can be no assurance the IRS will not take a contrary position regarding the tax consequences of the acquisition, ownership or disposition of our common stock or Warrants, or that any such contrary position would not be sustained by a court.

We assume in this discussion that the shares of our common stock and Warrants will be held as capital assets (generally, property held for investment). This discussion does not address all aspects of U.S. federal income taxes, does not discuss the potential application of the Medicare contribution tax or the alternative minimum tax and does not address state or local taxes or U.S. federal gift and estate tax laws, except as specifically provided below with respect to non-U.S. holders, or any non-U.S. tax consequences that may be relevant to holders in light of their particular circumstances. This discussion also does not address the special tax rules applicable to particular holders, such as:

- persons who acquired our common stock or warrants as compensation for services;
- traders in securities that elect to use a mark-to-market method of accounting for their securities holdings;
- persons that own, or are deemed to own, more than 5% of our common stock or warrants (except to the extent specifically set forth below);
- persons required for U.S. federal income tax purposes to conform the timing of income accruals to their financial statements under Section 451(b) of the Code;
- persons for whom our common stock constitutes “qualified small business stock” within the meaning of Section 1202 of the Code or “Section 1244 stock” for purposes of Section 1244 of the Code;
- persons deemed to sell our common stock or warrants under the constructive sale provisions of the Code;
- financial institutions;
- brokers or dealers in securities;
- tax-exempt organizations or tax-qualified retirement plans;
- pension plans;
- regulated investment companies or real estate investment trusts;
- owners that hold our common stock or Warrants as part of a straddle, hedge, conversion transaction, synthetic security or other integrated investment;
- insurance companies;
- controlled foreign corporations, passive foreign investment companies, or corporations that accumulate earnings to avoid U.S. federal income tax; and
- certain U.S. expatriates, former citizens, or long-term residents of the United States.

In addition, this discussion does not address the tax treatment of partnerships or other pass-through entities or persons who hold our common stock or Warrants through partnerships or other entities which are pass-through entities for U.S. federal income tax purposes. A partner in a partnership or other pass-through entity that will hold our common stock or Warrants should consult his, her or its own tax advisor regarding the tax consequences of the ownership and disposition of our common stock or Warrants through a partnership or other pass-through entity, as applicable.

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This discussion of U.S. federal income tax considerations is for general information purposes only and is not tax advice. Prospective investors should consult their own tax advisors regarding the U.S. federal, state, local and non-U.S. income and other tax considerations of acquiring, holding and disposing of our common stock and Warrants.

For the purposes of this discussion, a "U.S. Holder" means a beneficial owner of our common stock or Warrants that is for U.S. federal income tax purposes (a) an individual citizen or resident of the United States, (b) a corporation (or other entity taxable as a corporation for U.S. federal income tax purposes), created or organized in or under the laws of the United States, any state thereof or the District of Columbia, (c) an estate the income of which is subject to U.S. federal income taxation regardless of its source, or (d) a trust if it (1) is subject to the primary supervision of a court within the United States and one or more U.S. persons (within the meaning of Section 7701(a)(30) of the Code) has the authority to control all substantial decisions of the trust or (2) has a valid election in effect under applicable U.S. Treasury regulations to be treated as a U.S. person. A "Non-U.S. Holder" is, for U.S. federal income tax purposes, a beneficial owner of common stock or Warrants that is not a U.S. Holder or a partnership for U.S. federal income tax purposes.

Tax Cuts and Jobs Act

Under tax legislation signed into law in December 2017 commonly known as the Tax Cuts and Jobs Act of 2017, U.S. Holders that use an accrual method of accounting for tax purposes and have certain financial statements generally will be required to include certain amounts in income no later than the time such amounts are taken into account as revenue in such financial statements. The application of this rule thus may require the accrual of income earlier than would be the case under the general tax rules described below, although the precise application of this rule is unclear at this time. U.S. Holders that use an accrual method of accounting should consult with their tax advisors regarding the potential applicability of this legislation to their particular situation.

Treatment of Pre-Funded Warrants

Although it is not entirely free from doubt, a Pre-Funded Warrant should be treated as a share of our common stock for U.S. federal income tax purposes and a holder of Pre-Funded Warrants should generally be taxed in the same manner as a holder of common stock, as described below. Accordingly, no gain or loss should be recognized upon the exercise of a Pre-Funded Warrant and, upon exercise, the holding period of a Pre-Funded Warrant should carry over to the share of common stock received. Similarly, the tax basis of the Pre-Funded Warrant should carry over to the share of common stock received upon exercise, increased by the exercise price of \$0.001 per share. Each holder should consult his, her or its own tax advisor regarding the risks associated with the acquisition of Pre-Funded Warrants pursuant to this offering (including potential alternative characterizations). The balance of this discussion generally assumes that the characterization described above is respected for U.S. federal income tax purposes.

Allocation of Purchase Price

For U.S. federal income tax purposes, each share of common stock (or, in lieu of common stock, Pre-Funded Warrants) and the accompanying Class A Warrants issued pursuant to this offering will be treated as an "investment unit" consisting of one share of common stock or Pre-Funded Warrant, as applicable, and the accompanying Class A Warrants to acquire our common stock. The purchase price for each investment unit will be allocated between these components in proportion to their relative fair market values at the time the unit is purchased by the holder. This allocation of the purchase price for each unit will establish the holder's initial tax basis for U.S. federal income tax purposes in the share of common stock (or, in lieu of common stock, Pre-Funded Warrants) and the Warrants included in each unit. The separation of the share of common stock (or, in lieu of common stock, Pre-Funded Warrants)

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and the Warrants included in a unit should not be a taxable event for U.S. federal income tax purposes. Each holder should consult his, her or its own tax advisor regarding the allocation of the purchase price between the common stock (or, in lieu of common stock, Pre-Funded Warrants) and the Warrants.

Tax Considerations Applicable to U.S. Holders

Exercise and Expiration of Warrants

Except as discussed below with respect to the cashless exercise of a Warrant, a U.S. Holder generally will not recognize gain or loss for U.S. federal income tax purposes upon exercise of a Warrant. The U.S. Holder will take a tax basis in the shares acquired on the exercise of a Warrant equal to the exercise price of the Warrant, increased by the U.S. Holder's adjusted tax basis in the Warrant exercised (as determined pursuant to the rules discussed above). Except as discussed above with respect to the tax treatment of Pre-Funded Warrants, the U.S. Holder's holding period in the shares of our common stock acquired on the exercise of a Warrant will begin on the date of exercise or possibly the day after such exercise, and will not include any period for which the U.S. Holder held the Warrant.

The lapse or expiration of a Warrant will be treated as if the U.S. Holder sold or exchanged the Warrant and recognized a capital loss equal to the U.S. Holder's tax basis in the Warrant. The deductibility of capital losses is subject to limitations.

The tax consequences of a cashless exercise of a Warrant are not clear under current tax law. A cashless exercise may be tax-free, either because the exercise is not a realization event or because the exercise is treated as a recapitalization for U.S. federal income tax purposes. In either tax-free situation, a U.S. Holder's tax basis in the common stock received generally would equal the U.S. Holder's tax basis in the Warrants. If the cashless exercise was not a realization event, it is unclear whether a U.S. Holder's holding period for the common stock would be treated as commencing on the date of exercise of the Warrant or the day following the date of exercise of the Warrant. If the cashless exercise were treated as a recapitalization, the holding period of the common stock would include the holding period of the Warrants.

It is also possible that a cashless exercise could be treated as a taxable exchange in which gain or loss would be recognized. In such event, a U.S. Holder could be deemed to have surrendered Warrants having an aggregate fair market value equal to the exercise price for the total number of Warrants to be exercised. The U.S. Holder would recognize capital gain or loss in an amount equal to the difference between the fair market value of the common stock received in respect of the Warrants deemed surrendered and the U.S. Holder's tax basis in such Warrants. Such gain or loss would be long-term or short-term, depending on the U.S. Holder's holding period in the Warrants deemed surrendered. In this case, a U.S. Holder's tax basis in the common stock received would equal the sum of the U.S. Holder's initial investment in the exercised Warrants (i.e., the portion of the U.S. Holder's purchase price for the investment unit that is allocated to the Warrants, as described above under "Allocation of Purchase Price Between our Common Stock and Warrants") and the exercise price of such Warrants. It is unclear whether a U.S. Holder's holding period for the common stock would commence on the date of exercise of the Warrant or the day following the date of exercise of the Warrant. There may also be alternative characterizations of any such taxable exchange that would result in similar tax consequences, except that a U.S. Holder's gain or loss would be short-term.

Due to the absence of authority on the U.S. federal income tax treatment of a cashless exercise, there can be no assurance which, if any, of the alternative tax consequences and holding periods described above would be adopted by the IRS or a court of law. Accordingly, U.S. Holders should consult their tax advisors regarding the tax consequences of a cashless exercise of the Warrants.

Distributions

As discussed above, we currently anticipate that we will retain future earnings, if any, to finance the growth and development of our business and do not intend to pay cash dividends in respect of our common stock in the foreseeable future. In the event that we do make distributions on our common stock to a U.S. Holder, those distributions generally will constitute dividends for U.S. tax purposes to the extent paid out of our current or accumulated earnings and profits (as determined under U.S. federal income tax principles). Distributions in excess of our current and accumulated earnings and profits will constitute a return of capital that is applied against and reduces, but not below zero, a U.S. Holder's adjusted tax basis in our common stock. Any remaining excess will be treated as gain realized on the sale or exchange of our common stock as described below under the section titled "—Disposition of Our Common Stock or Warrants."

Certain Adjustments to Warrants

The number of shares of common stock issued upon the exercise of the Warrants and the exercise price of Warrants are subject to adjustment in certain circumstances. Adjustments (or failure to make adjustments) that have the effect of increasing a U.S. Holder's proportionate interest in our assets or earnings and profits may, in some circumstances, result in a constructive distribution to the U.S. Holder. Adjustments to the conversion rate made pursuant to a bona fide reasonable adjustment formula which has the effect of preventing the dilution of the interest of the holders of Warrants generally will not be deemed to result in a constructive distribution. If an adjustment is made that does not qualify as being made pursuant to a bona fide reasonable adjustment formula, a U.S. Holder of Warrants may be deemed to have received a constructive distribution from us, even though such U.S. Holder has not received any cash or property as a result of such adjustment. The tax consequences of the receipt of a distribution from us are described above under "Distributions."

Disposition of Our Common Stock or Warrants

Upon a sale or other taxable disposition (other than a redemption treated as a distribution, which will be taxed as described above under "Distributions") of our common stock or Warrants, a U.S. Holder generally will recognize capital gain or loss in an amount equal to the difference between the amount realized and the U.S. Holder's adjusted tax basis in the common stock or Warrants. Capital gain or loss will constitute long-term capital gain or loss if the U.S. Holder's holding period for the common stock or Warrants exceeds one year. The deductibility of capital losses is subject to certain limitations. U.S. Holders who recognize losses with respect to a disposition of our common stock or Warrants should consult their own tax advisors regarding the tax treatment of such losses.

Information Reporting and Backup Reporting

Information reporting requirements generally will apply to payments of dividends (including constructive dividends) on the common stock and Warrants and to the proceeds of a sale or other disposition of common stock and Warrants paid by us to a U.S. Holder unless such U.S. Holder is an exempt recipient, such as a corporation. Backup withholding will apply to those payments if the U.S. Holder fails to provide the holder's taxpayer identification number, or certification of exempt status, or if the holder otherwise fails to comply with applicable requirements to establish an exemption.

Backup withholding is not an additional tax. Rather, any amounts withheld under the backup withholding rules will be allowed as a refund or a credit against the U.S. Holder's U.S. federal income tax liability provided the required information is timely furnished to the IRS. U.S. Holders should consult their own tax advisors regarding their qualification for exemption from information reporting and backup withholding and the procedure for obtaining such exemption.

Tax Considerations Applicable to Non-U.S. Holders

Exercise and Expiration of Warrants

In general, a Non-U.S. Holder will not recognize gain or loss for U.S. federal income tax purposes upon the exercise of Warrants into shares of common stock, however, to the extent a cashless exercise results in a taxable exchange, the consequences would be similar to those described in the discussion below under “Disposition of our Common Stock or Warrants”.

The expiration of a Warrant will be treated as if the Non-U.S. Holder sold or exchanged the Warrant and recognized a capital loss equal to the Non-U.S. Holder’s tax basis in the Warrant. However, a Non-U.S. Holder will not be able to utilize a loss recognized upon expiration of a Warrant against the Non-U.S. Holder’s U.S. federal income tax liability unless the loss is effectively connected with the Non-U.S. Holder’s conduct of a trade or business within the United States (and, if an income tax treaty applies, is attributable to a permanent establishment or fixed base in the United States) or is treated as a U.S.-source loss and the Non-U.S. Holder is present 183 days or more in the taxable year of disposition and certain other conditions are met.

Certain Adjustments to Warrants

As described under “—U.S. Holders—Certain Adjustments to Warrants,” an adjustment to the Warrants could result in a constructive distribution to a Non-U.S. Holder, which would be treated as described under “Distributions” below. Any resulting withholding tax attributable to deemed dividends would be collected from other amounts payable or distributable to the Non-U.S. Holder. Non-U.S. Holders should consult their tax advisors regarding the proper treatment of any adjustments to the Warrants.

In addition, regulations governing “dividend equivalents” under Section 871(m) of the Code may apply to the Pre-Funded Warrants. Under those regulations, an implicit or explicit payment under the Pre-Funded Warrants that references a dividend distribution on our common stock would possibly be taxable to a Non-U.S. Holder as described under “Distributions” below. Such dividend equivalent amount would be taxable and subject to withholding whether or not there is actual payment of cash or other property, and the Company may satisfy any withholding obligations it has in respect of the Pre-Funded Warrants by withholding from other amounts due to the Non-U.S. Holder. Non-U.S. Holders are encouraged to consult their own tax advisors regarding the application of Section 871(m) of the Code to the Pre-Funded Warrants.

Distributions

As discussed above, we currently anticipate that we will retain future earnings, if any, to finance the growth and development of our business and do not intend to pay cash dividends in respect of our common stock in the foreseeable future. In the event that we do make distributions on our common stock to a Non-U.S. Holder, those distributions generally will constitute dividends for U.S. federal income tax purposes as described in “—U.S. Holders—Distributions.”

Any distribution (including constructive distributions) on our common stock that is treated as a dividend paid to a Non-U.S. Holder that is not effectively connected with the holder’s conduct of a trade or business in the United States will generally be subject to withholding tax at a 30% rate or such lower rate as may be specified by an applicable income tax treaty between the United States and the Non-U.S. Holder’s country of residence. To obtain a reduced rate of withholding under a treaty, a Non-U.S. Holder generally will be required to provide the applicable withholding agent with a properly executed IRS Form W-8BEN, IRS Form W-8BEN-E or other appropriate form, certifying the Non-U.S. Holder’s entitlement to benefits under that treaty. Such form must be provided prior to the payment of dividends and must be updated periodically. If a Non-U.S. Holder holds stock through a financial institution or other agent acting on the holder’s behalf, the holder will be required to provide appropriate documentation to such agent. The holder’s agent may then be required to provide certification to the

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applicable withholding agent, either directly or through other intermediaries. If you are eligible for a reduced rate of U.S. withholding tax under an income tax treaty, you should consult with your own tax advisor to determine if you are able to obtain a refund or credit of any excess amounts withheld by timely filing an appropriate claim for a refund with the IRS.

We generally are not required to withhold tax on dividends paid (or constructive dividends deemed paid) to a Non-U.S. Holder that are effectively connected with the holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, are attributable to a permanent establishment or fixed base that the holder maintains in the United States) if a properly executed IRS Form W-8ECI, stating that the dividends are so connected, is furnished to us (or, if stock is held through a financial institution or other agent, to the applicable withholding agent). In general, such effectively connected dividends will be subject to U.S. federal income tax on a net income basis at the regular tax rates applicable to U.S. persons. A corporate Non-U.S. Holder receiving effectively connected dividends may also be subject to an additional "branch profits tax," which is imposed, under certain circumstances, at a rate of 30% (or such lower rate as may be specified by an applicable treaty) on the corporate Non-U.S. Holder's effectively connected earnings and profits, subject to certain adjustments.

See also the sections below titled "—Backup Withholding and Information Reporting" and "—Foreign Accounts" for additional withholding rules that may apply to dividends paid to certain foreign financial institutions or non-financial foreign entities.

Disposition of Our Common Stock or Warrants

Subject to the discussions below under the sections titled "—Backup Withholding and Information Reporting" and "—Foreign Accounts," a Non-U.S. Holder generally will not be subject to U.S. federal income or withholding tax with respect to gain recognized on a sale or other disposition (other than a redemption treated as a distribution, which will be taxable as described above under "Distributions") of our common stock or Warrants unless:

- the gain is effectively connected with the Non-U.S. Holder's conduct of a trade or business in the United States, and if an applicable income tax treaty so provides, the gain is attributable to a permanent establishment or fixed base maintained by the Non-U.S. Holder in the United States; in these cases, the Non-U.S. Holder will be taxed on a net income basis at the regular tax rates and in the manner applicable to U.S. persons, and if the Non-U.S. Holder is a corporation, an additional branch profits tax at a rate of 30%, or a lower rate as may be specified by an applicable income tax treaty, may also apply;
- the Non-U.S. Holder is a nonresident alien present in the United States for 183 days or more in the taxable year of the disposition and certain other requirements are met, in which case the Non-U.S. Holder will be subject to a 30% tax (or such lower rate as may be specified by an applicable income tax treaty between the United States and such holder's country of residence) on the net gain derived from the disposition, which may be offset by certain U.S.-source capital losses of the Non-U.S. Holder, if any; or
- our common stock constitutes a U.S. real property interest because we are, or have been at any time during the five-year period preceding such disposition (or the Non-U.S. Holder's holding period of the common stock or Warrants, if shorter), a "U.S. real property holding corporation," unless our common stock is regularly traded on an established securities market, as defined by applicable Treasury Regulations, and the Non-U.S. Holder held no more than 5% of our outstanding common stock, directly or indirectly, during the shorter of the five-year period ending on the date of the disposition or the period that the Non-U.S. Holder held our common stock. Special rules may apply to the determination of the 5% threshold in the case of a holder of Warrants. Non-U.S. Holders are urged to consult their own tax advisors regarding the effect of holding our Warrants on the calculation of such 5% threshold. Generally, a corporation is a "U.S. real property holding

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corporation" if the fair market value of its "U.S. real property interests" (as defined in the Code and applicable regulations) equals or exceeds 50% of the sum of the fair market value of its worldwide real property interests plus its other assets used or held for use in a trade or business. Although there can be no assurance, we believe that we are not currently, and we do not anticipate becoming, a "U.S. real property holding corporation" for U.S. federal income tax purposes. No assurance can be provided that our common stock will be regularly traded on an established securities market for purposes of the rules described above. Non-U.S. Holders are urged to consult their own tax advisors regarding the U.S. federal income tax considerations that could result if we are, or become a "U.S. real property holding corporation."

See the sections titled "—Backup Withholding and Information Reporting" and "—Foreign Accounts" for additional information regarding withholding rules that may apply to proceeds of a disposition of our common stock or Warrants paid to foreign financial institutions or non-financial foreign entities.

Backup Withholding and Information Reporting

We must report annually to the IRS and to each Non-U.S. Holder the gross amount of the distributions (including constructive distributions) on our common stock or Warrants paid to such holder and the tax withheld, if any, with respect to such distributions. Non-U.S. Holders may have to comply with specific certification procedures to establish that the holder is not a U.S. person (as defined in the Code) in order to avoid backup withholding at the applicable rate, currently 24%, with respect to dividends (or constructive dividends) on our common stock or Warrants. Generally, a holder will comply with such procedures if it provides a properly executed IRS Form W-8BEN (or other applicable Form W-8) or otherwise meets documentary evidence requirements for establishing that it is a Non-U.S. Holder, or otherwise establishes an exemption. Dividends paid to Non-U.S. Holders subject to withholding of U.S. federal income tax, as described above under the heading "Dividends," will generally be exempt from U.S. backup withholding.

Information reporting and backup withholding generally will apply to the proceeds of a disposition of our common stock or Warrants by a Non-U.S. Holder effected by or through the U.S. office of any broker, U.S. or foreign, unless the holder certifies its status as a Non-U.S. Holder and satisfies certain other requirements, or otherwise establishes an exemption. Generally, information reporting and backup withholding will not apply to a payment of disposition proceeds to a Non-U.S. Holder where the transaction is effected outside the United States through a non-U.S. office of a broker. However, for information reporting purposes, dispositions effected through a non-U.S. office of a broker with substantial U.S. ownership or operations generally will be treated in a manner similar to dispositions effected through a U.S. office of a broker. Non-U.S. Holders should consult their own tax advisors regarding the application of the information reporting and backup withholding rules to them.

Copies of information returns may be made available to the tax authorities of the country in which the Non-U.S. Holder resides or is incorporated under the provisions of a specific treaty or agreement.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules from a payment to a Non-U.S. Holder can be refunded or credited against the Non-U.S. Holder's U.S. federal income tax liability, if any, provided that an appropriate claim is timely filed with the IRS.

Foreign Accounts

The Foreign Account Tax Compliance Act, or FATCA, generally imposes a 30% withholding tax on dividends (including constructive dividends) on, and gross proceeds from the sale or other disposition of, our common stock and Warrants if paid to a non-U.S. entity unless (i) if the non-U.S. entity is a "foreign financial institution," the non-U.S. entity undertakes certain due diligence, reporting,

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withholding, and certification obligations, (ii) if the non-U.S. entity is not a “foreign financial institution,” the non-U.S. entity identifies certain of its U.S. investors, if any, or (iii) the non-U.S. entity is otherwise exempt under FATCA.

Withholding under FATCA generally will apply to payments of dividends (including constructive dividends) on our common stock and Warrants. While withholding under FATCA may apply to payments of gross proceeds from a sale or other disposition of our common stock or Warrants, under recently proposed U.S. Treasury Regulations withholding on payments of gross proceeds is not required. Although such regulations are not final, applicable withholding agents may rely on the proposed regulations until final regulations are issued.

An intergovernmental agreement between the United States and an applicable foreign country may modify the requirements described in this section. Under certain circumstances, a holder may be eligible for refunds or credits of the tax. Holders should consult their own tax advisors regarding the possible implications of FATCA on their investment in our common stock or Warrants.

Federal Estate Tax

Common stock owned or treated as owned by an individual who is not a citizen or resident of the United States (as specially defined for U.S. federal estate tax purposes) at the time of death will be included in the individual’s gross estate for U.S. federal estate tax purposes and, therefore, may be subject to U.S. federal estate tax, unless an applicable estate tax or other treaty provides otherwise. The foregoing may also apply to Warrants. A Non-U.S. Holder should consult his, her, or its own tax advisor regarding the U.S. federal estate tax consequences of the ownership or disposition of shares of our common stock and Warrants.

The preceding discussion of material U.S. federal tax considerations is for information only. It is not tax advice. Prospective investors should consult their own tax advisors regarding the particular U.S. federal, state, local and non-U.S. tax consequences of purchasing, holding and disposing of our common stock or Warrants, including the consequences of any proposed changes in applicable laws.

UNDERWRITING

We and the underwriters for the offering named below have entered into an underwriting agreement with respect to the securities being offered. Subject to the terms and conditions of the underwriting agreement, each underwriter has severally agreed to purchase from us the number of securities set forth opposite its name below. Cowen and Company, LLC and Stifel, Nicolaus & Company, Incorporated are the representatives of the underwriters, or the Representatives.

Underwriter	Number of Shares	Number of Pre-Funded Warrants	Number of Class A Warrants
Cowen and Company, LLC	2,806,650	1,054,350	1,930,500
Stifel, Nicolaus & Company, Incorporated	2,296,350	862,650	1,579,500
Canaccord Genuity LLC	567,000	213,000	390,000
Total	<u>5,670,000</u>	<u>2,130,000</u>	<u>3,900,000</u>

The underwriting agreement provides that the obligations of the underwriters are subject to certain conditions precedent and that the underwriters have agreed, severally and not jointly, to purchase all of the number of securities sold under the underwriting agreement if any of these securities are purchased. If an underwriter defaults, the underwriting agreement provides that the purchase commitments of the non-defaulting underwriters may be increased or the underwriting agreement may be terminated.

We have agreed to indemnify the underwriters against specified liabilities, including liabilities under the Securities Act, and to contribute to payments the underwriters may be required to make in respect thereof.

Our common stock is listed on the Nasdaq Capital Market under the symbol "XFOR." There is no established public trading market for the Pre-Funded Warrants or Class A Warrants, and we do not expect a market to develop. We do not intend to list the Pre-Funded Warrants or Class A Warrants on the Nasdaq Capital Market, any other national securities exchange or any other nationally recognized trading system.

The underwriters are offering the shares of common stock or Pre-Funded Warrants, and the accompanying Class A Warrants, subject to prior sale, when, as and if issued to and accepted by them, subject to approval of legal matters by their counsel and other conditions specified in the underwriting agreement. The underwriters reserve the right to withdraw, cancel or modify offers to the public and to reject orders in whole or in part.

Discounts. The following table shows the public offering price, underwriting discount and proceeds, before expenses to us.

	Per Share and Accompanying Class A Warrants	Per Pre-Funded Warrant and Accompanying Class A Warrants	Total
Public offering price	\$ 11.00	\$ 10.999	\$85,797,870
Underwriting discounts	\$ 0.715	\$ 0.715	\$ 5,576,862
Proceeds, before expenses, to us	\$ 10.285	\$ 10.284	\$80,221,008

We estimate that the total expenses of the offering payable by us, excluding underwriting discounts, will be approximately \$1.3 million. We have agreed to reimburse the underwriters for FINRA and certain other expenses of up to \$40,000 related to this offering.

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The underwriters propose to offer the securities to the public at the public offering price set forth on the cover of this prospectus. The underwriters may offer the securities to securities dealers at the public offering price less a concession not in excess of \$0.429 per share. If all of the securities are not sold at the public offering price, the underwriters may change the offering price and other selling terms.

Discretionary Accounts. The underwriters do not intend to confirm sales of the shares to any accounts over which they have discretionary authority.

Passive Market Making. In connection with this offering, underwriters and selling group members may engage in passive market making transactions in our common stock on the Nasdaq Stock Market in accordance with Rule 103 of Regulation M under the Securities Exchange Act of 1934, as amended, during a period before the commencement of offers or sales of securities and extending through the completion of the distribution. A passive market maker must display its bid at a price not in excess of the highest independent bid of that security. However, if all independent bids are lowered below the passive market maker's bid, such bid must then be lowered when specified purchase limits are exceeded.

Lock-Up Agreements. Pursuant to certain "lock-up" agreements, we and our executive officers and directors, have agreed, subject to certain exceptions, not to offer, sell, assign, transfer, pledge, contract to sell, or otherwise dispose of or announce the intention to otherwise dispose of, or enter into any swap, hedge or similar agreement or arrangement that transfers, in whole or in part, the economic consequence of ownership of, directly or indirectly, any common stock or securities convertible into or exchangeable or exercisable for any common stock without the prior written consent of the Representatives for a period of 90 days after the date of the pricing of the offering.

This lock-up provision applies to common stock and to securities convertible into or exchangeable or exercisable for common stock. It also applies to common stock owned now or acquired later by the person executing the agreement or for which the person executing the agreement later acquires the power of disposition. The exceptions permit us, among other things and subject to restrictions, to: (a) issue common stock or options pursuant to employee benefit plans, (b) issue common stock upon exercise of outstanding options or warrants (c) issue securities in connection with acquisitions or similar transactions, or (d) file registration statements on Form S-8. The exceptions permit parties to the "lock-up" agreements, among other things and subject to restrictions, to: (a) make certain gifts, (b) if the party is a corporation, partnership, limited liability company or other business entity, make transfers to any shareholders, partners, members of, or owners of similar equity interests in, the party, or to an affiliate of the party, if such transfer is not for value, (c) if the party is a corporation, partnership, limited liability company or other business entity, make transfers in connection with the sale or transfer of all of the party's capital stock, partnership interests, membership interests or other similar equity interests, as the case may be, or all or substantially all of the party's assets, in any such case not undertaken for the purpose of avoiding the restrictions imposed by the "lock-up" agreement and (d) participate in tender offers, mergers or similar transactions involving the acquisition of 90% of the voting power of our stock. In addition, the lock-up provision will not restrict broker-dealers from engaging in market making and similar activities conducted in the ordinary course of their business.

The Representatives, in their sole discretion, may release our common stock and other securities subject to the lock-up agreements described above in whole or in part at any time. When determining whether or not to release our common stock and other securities from lock-up agreements, the Representatives will consider, among other factors, the holder's reasons for requesting the release, the number of shares for which the release is being requested and market conditions at the time of the request.

Canada. The securities may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 *Prospectus*

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Exemptions or subsection 73.3(1) of the *Securities Act* (Ontario), and are permitted clients, as defined in National Instrument 31-103 *Registration Requirements, Exemptions and Ongoing Registrant Obligations*. Any resale of the securities must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus supplement (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to section 3A.3 of National Instrument 33-105 *Underwriting Conflicts* (NI 33-105), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

United Kingdom. Each of the underwriters has represented and agreed that:

- it has not made or will not make an offer of the securities to the public in the United Kingdom within the meaning of section 102B of the Financial Services and Markets Act 2000 (as amended) (FSMA) except to legal entities which are authorized or regulated to operate in the financial markets or, if not so authorized or regulated, whose corporate purpose is solely to invest in securities or otherwise in circumstances which do not require the publication by us of a prospectus pursuant to the Prospectus Rules of the Financial Services Authority (FSA);
- it has only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of section 21 of FSMA) to persons who have professional experience in matters relating to investments falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 or in circumstances in which section 21 of FSMA does not apply to us; and
- it has complied with and will comply with all applicable provisions of FSMA with respect to anything done by it in relation to the securities in, from or otherwise involving the United Kingdom.

Switzerland. The securities will not be offered, directly or indirectly, to the public in Switzerland and this prospectus does not constitute a public offering prospectus as that term is understood pursuant to article 652a or 1156 of the Swiss Federal Code of Obligations.

European Economic Area. In relation to each Member State of the European Economic Area (the "EEA") which has implemented the European Prospectus Directive (each, a "Relevant Member State"), an offer of our shares may not be made to the public in a Relevant Member State other than:

- to any legal entity which is a qualified investor, as defined in the European Prospectus Directive;
- to fewer than 150 natural or legal persons (other than qualified investors as defined in the European Prospectus Directive), subject to obtaining the prior consent of the relevant dealer or dealers nominated by us for any such offer, or;
- in any other circumstances falling within Article 3(2) of the European Prospectus Directive,

provided that no such offer of our shares shall require us or any underwriter to publish a prospectus pursuant to Article 3 of the European Prospectus Directive or supplement prospectus pursuant to Article 16 of the European Prospectus Directive and each person who initially acquires any shares or to whom any offer is made will be deemed to have represented, acknowledged and agreed to and with each of the underwriters and with us that it is a "qualified investor" within the meaning of the law in that Relevant Member State implementing Article 2(1) (e) of the European Prospectus Directive.

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In the case of any shares being offered to a financial intermediary as that term is used in Article 3(2) of the European Prospectus Directive, each such financial intermediary will be deemed to have represented, acknowledged and agreed that the shares acquired by it in the offer have not been acquired on a non-discretionary basis on behalf of, nor have they been acquired with a view to their offer or resale to, persons in circumstances which may give rise to an offer or any shares to the public other than their offer or resale in a Relevant Member State to qualified investors as so defined or in circumstances in which the prior consent of the Representatives has been obtained to each such proposed offer or resale.

For the purposes of this description, the expression an “offer to the public” in relation to the securities in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the securities to be offered so as to enable an investor to decide to purchase or subscribe for the securities, as the expression may be varied in that Relevant Member State by any measure implementing the European Prospectus Directive in that member state, and the expression “European Prospectus Directive” means Directive 2003/71/EC (and amendments hereto, including the 2010 PD Amending Directive, to the extent implemented in the Relevant Member State) and includes any relevant implementing measure in each Relevant Member State. The expression 2010 PD Amending Directive means Directive 2010/73/EU.

We have not authorized and do not authorize the making of any offer of securities through any financial intermediary on our behalf, other than offers made by the underwriters and their respective affiliates, with a view to the final placement of the securities as contemplated in this document. Accordingly, no purchaser of the shares, other than the underwriters, is authorized to make any further offer of shares on our behalf or on behalf of the underwriters.

Electronic Offer, Sale and Distribution of Shares. A prospectus in electronic format may be made available on the websites maintained by one or more of the underwriters or selling group members, if any, participating in this offering and one or more of the underwriters participating in this offering may distribute prospectuses electronically. The Representatives may agree to allocate a number of shares and accompanying Warrants to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the underwriters and selling group members that will make internet distributions on the same basis as other allocations. Other than the prospectus in electronic format, the information on these websites is not part of this prospectus or the registration statement of which this prospectus forms a part, has not been approved or endorsed by us or any underwriter in its capacity as underwriter, and should not be relied upon by investors.

Other Relationships. Certain of the underwriters and their affiliates have provided, and may in the future provide, various investment banking, commercial banking and other financial services for us and our affiliates for which they have received, and may in the future receive, customary fees. Stifel, Nicolaus & Company, Incorporated, an underwriter in this offering, provided financial advisory services to us in connection with the business combination completed on March 13, 2019 pursuant to that certain Agreement and Plan of Merger, dated as of November 26, 2018, as amended.

LEGAL MATTERS

The validity of the issuance of the securities offered by us in this offering will be passed upon for us by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts. Certain legal matters will be passed upon for the underwriters by Cooley LLP, Boston, Massachusetts.

EXPERTS

The financial statements of Arsanis, Inc. incorporated in this prospectus supplement by reference to the Annual Report on Form 10-K of Arsanis, Inc. for the year ended December 31, 2018 have been so incorporated in reliance on the report (which contains an explanatory paragraph relating to Arsanis, Inc.'s requirement for additional financing to fund future operations as described in Note 1 to the consolidated financial statements) of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

The audited historical financial statements of X4 Therapeutics, Inc. (formerly X4 Pharmaceuticals, Inc.) included as Exhibit 99.1 of X4 Pharmaceuticals, Inc.'s (formerly Arsanis, Inc.) Current Report on Form 8-K dated April 3, 2019 have been so incorporated in reliance on the report (which contains an explanatory paragraph relating to X4 Therapeutics, Inc.'s ability to continue as a going concern as described in Note 1 to the consolidated financial statements) of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the reporting requirements of the Exchange Act and file annual, quarterly and current reports, proxy statements and other information with the SEC. Our SEC filings are available at the SEC's web site at <http://www.sec.gov>.

We also maintain a website at www.x4pharma.com, through which you can access our SEC filings. The information set forth on our website is not part of this prospectus supplement or the accompanying prospectus.

This prospectus supplement is part of a registration statement we filed with the SEC. This prospectus supplement and the accompanying prospectus omit some information contained in the registration statement in accordance with SEC rules and regulations. You should review the information and exhibits in the registration statement for further information on us and our consolidated subsidiaries and the securities we are offering. Statements in this prospectus supplement and the accompanying prospectus concerning any document we filed as an exhibit to the registration statement or that we otherwise filed with the SEC are not intended to be comprehensive and are qualified by reference to these filings. You should review the complete document to evaluate these statements. You can obtain a copy of the registration statement from the SEC's website.

INCORPORATION OF DOCUMENTS BY REFERENCE

The SEC allows us to “incorporate by reference” information that we file with them. Incorporation by reference allows us to disclose important information to you by referring you to those other documents. The information incorporated by reference is an important part of this prospectus supplement, and information that we file later with the SEC will automatically update and supersede this information. We filed a registration statement on Form S-3 under the Securities Act with the SEC with respect to the securities we may offer pursuant to this prospectus supplement. This prospectus supplement omits certain information contained in the registration statement, as permitted by the SEC. You should refer to the registration statement, including the exhibits, for further information about us and the securities we may offer pursuant to this prospectus supplement. Statements in this prospectus supplement regarding the provisions of certain documents filed with, or incorporated by reference in, the registration statement are not necessarily complete and each statement is qualified in all respects by that reference. Copies of all or any part of the registration statement, including the documents incorporated by reference or the exhibits, may be obtained upon payment of the prescribed rates at the offices of the SEC listed above in “Where You Can Find More Information.” The documents we are incorporating by reference are:

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2018 that we filed with the SEC on March 11, 2019;
- our Current Reports on Form 8-K that we filed with the SEC on January 16, 2019, February 8, 2019, March 1, 2019, March 8, 2019, March 13, 2019 (as amended on April 3, 2019), April 1, 2019, April 2, 2019, April 11, 2019 and April 12, 2019 (in each case, except for information contained therein which is furnished rather than filed);
- the description of our common stock contained in our Registration Statement on Form 8-A that we filed with the SEC on November 15, 2017, including any amendment or report filed for the purpose of updating such description; and
- all reports and other documents subsequently filed by us pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Exchange Act after the date of this prospectus supplement and prior to the termination or completion of the offering of securities under this prospectus supplement shall be deemed to be incorporated by reference in this prospectus supplement and to be a part hereof from the date of filing such reports and other documents.

The SEC file number for each of the documents listed above is File No. 001-38295.

Any statement contained in this prospectus supplement or the accompanying prospectus or in a document incorporated or deemed to be incorporated by reference into this prospectus supplement or in the accompanying prospectus will be deemed to be modified or superseded for purposes of this prospectus supplement and the accompanying prospectus to the extent that a statement contained in this prospectus supplement or the accompanying prospectus or any other subsequently filed document that is deemed to be incorporated by reference into this prospectus supplement or the accompanying prospectus modifies or supersedes the statement. Any statement so modified or superseded will not be deemed, except as so modified or superseded, to constitute a part of this prospectus supplement or the accompanying prospectus.

You may request, orally or in writing, a copy of any or all of the documents incorporated herein by reference. These documents will be provided to you at no cost, by contacting:

X4 Pharmaceuticals, Inc.
955 Massachusetts Avenue, 4th Floor
Cambridge, Massachusetts 02139
Telephone: (857) 529-8300

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You may also access these documents on our website, <http://www.x4pharma.com>. The information contained on, or that can be accessed through, our website is not a part of this prospectus supplement. We have included our website address in this prospectus supplement solely as an inactive textual reference.

You should rely only on information contained in, or incorporated by reference into, this prospectus supplement and the accompanying prospectus. We have not authorized anyone to provide you with information different from that contained in this prospectus supplement or the accompanying prospectus or incorporated by reference in this prospectus supplement or the accompanying prospectus. We are not making offers to sell the securities in any jurisdiction in which such an offer or solicitation is not authorized or in which the person making such offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make such offer or solicitation.

\$150,000,000
PROSPECTUS
Arsanis, Inc.
Debt Securities
Common Stock
Preferred Stock
Units
Warrants

We may offer and sell securities from time to time in one or more offerings of up to \$150,000,000 in aggregate offering price. This prospectus describes the general terms of these securities and the general manner in which these securities will be offered. We will provide the specific terms of these securities in supplements to this prospectus. The prospectus supplements will also describe the specific manner in which these securities will be offered and may also supplement, update or amend information contained in this document. You should read this prospectus and any applicable prospectus supplement before you invest.

We may offer these securities in amounts, at prices and on terms determined at the time of offering. The securities may be sold directly to you, through agents, or through underwriters and dealers. If agents, underwriters or dealers are used to sell the securities, we will name them and describe their compensation in a prospectus supplement.

Our common stock is listed on the Nasdaq Global Market under the symbol "ASNS".

As of January 14, 2019, the aggregate market value of our outstanding common stock held by non-affiliates was approximately \$26.0 million, which was calculated based on 7,454,904 shares of outstanding common stock held by non-affiliates and a price per share of \$3.48. Pursuant to General Instruction I.B.6 of Form S-3, in no event will we sell, pursuant to the registration statement of which this prospectus forms a part, securities in a public primary offering with a value exceeding one-third of the aggregate market value of our common stock held by non-affiliates in any 12-month period, so long as the aggregate market value of our outstanding common stock held by non-affiliates remains below \$75 million. During the 12 calendar months prior to and including the date of this prospectus, we have not offered or sold any securities pursuant to General Instruction I.B.6 of Form S-3.

Investing in these securities involves certain risks. See "[Risk Factors](#)" on page 6 of this prospectus and included in any accompanying prospectus supplement and in the documents incorporated by reference in this prospectus for a discussion of the factors you should carefully consider before deciding to purchase these securities.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The date of this prospectus is February 19, 2019

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission, which we refer to as the “SEC,” utilizing a “shelf” registration process. Under this shelf registration process, we may from time to time sell any combination of the securities described in this prospectus in one or more offerings for an aggregate initial offering price of up to \$150,000,000.

This prospectus provides you with a general description of the securities we may offer. Each time we sell securities under this prospectus, we will provide one or more prospectus supplements that will contain specific information about the terms of the offering. The prospectus supplement may also add, update or change information contained in this prospectus. You should read both this prospectus and the accompanying prospectus supplement together with the additional information described under the heading “Where You Can Find More Information” beginning on page 2 of this prospectus.

You should rely only on the information contained in or incorporated by reference in this prospectus, any accompanying prospectus supplement or in any related free writing prospectus filed by us with the SEC. We have not authorized anyone to provide you with different information. This prospectus and any accompanying prospectus supplement do not constitute an offer to sell or the solicitation of an offer to buy any securities other than the securities described in this prospectus or such accompanying prospectus supplement or an offer to sell or the solicitation of an offer to buy such securities in any circumstances in which such offer or solicitation is unlawful. You should assume that the information appearing in this prospectus, any prospectus supplement, the documents incorporated by reference and any related free writing prospectus is accurate only as of their respective dates. Our business, financial condition, results of operations and prospects may have changed materially since those dates.

We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference in this prospectus were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreements, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

This prospectus may not be used to consummate sales of our securities unless it is accompanied by a prospectus supplement. To the extent there are inconsistencies between any prospectus supplement, this prospectus and any documents incorporated by reference, the document with the most recent date will control.

Unless the context otherwise indicates, references in this prospectus to “we,” “our” and “us” refer, collectively, to Arsanis, Inc., a Delaware corporation, and its consolidated subsidiaries.

We own or have rights to trademarks, service marks and trade names that we use in connection with the operation of our business, including our corporate name, logos and website names. Other trademarks, service marks and trade names appearing in this prospectus are the property of their respective owners. Solely for convenience, some of the trademarks, service marks and trade names referred to in this prospectus are listed without the ® and ™ symbols, but we will assert, to the fullest extent under applicable law, our rights to our trademarks, service marks and trade names.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC. Our SEC filings are available to the public over the Internet at the SEC's website at <http://www.sec.gov>. Copies of certain information filed by us with the SEC are also available on our website at www.arsanis.com. Our website is not a part of this prospectus and is not incorporated by reference in this prospectus. You may also read and copy any document we file at the SEC's Public Reference Room, 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information on the operation of the Public Reference Room.

This prospectus is part of a registration statement we filed with the SEC. This prospectus omits some information contained in the registration statement in accordance with SEC rules and regulations. You should review the information and exhibits in the registration statement for further information about us and our consolidated subsidiaries and the securities we are offering. Statements in this prospectus concerning any document we filed as an exhibit to the registration statement or that we otherwise filed with the SEC are not intended to be comprehensive and are qualified by reference to these filings. You should review the complete document to evaluate these statements.

INCORPORATION BY REFERENCE

The SEC allows us to incorporate by reference much of the information we file with the SEC, which means that we can disclose important information to you by referring you to those publicly available documents. The information that we incorporate by reference in this prospectus is considered to be part of this prospectus. Because we are incorporating by reference future filings with the SEC, this prospectus is continually updated and those future filings may modify or supersede some of the information included or incorporated in this prospectus. This means that you must look at all of the SEC filings that we incorporate by reference to determine if any of the statements in this prospectus or in any document previously incorporated by reference have been modified or superseded. This prospectus incorporates by reference the documents listed below (File No. 001-38295) and any future filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act (in each case, other than those documents or the portions of those documents not deemed to be filed) between the date of the initial registration statement and the effectiveness of the registration statement and following the effectiveness of the registration statement until the offering of the securities under the registration statement is terminated or completed:

- Our Annual Report on Form 10-K for the fiscal year ended December 31, 2017 filed with the SEC on March 9, 2018, including the information specifically incorporated by reference into the Annual Report on Form 10-K from our definitive proxy statement for the 2018 Annual Meeting of Stockholders;
- Our Quarterly Report on Form 10-Q for the fiscal quarter ended March 31, 2018 filed with the SEC on May 10, 2018, our Quarterly Report on Form 10-Q for the fiscal quarter ended June 30, 2018 filed with the SEC on August 13, 2018, and our Quarterly Report on Form 10-Q for the fiscal quarter ended September 30, 2018 filed with the SEC on November 9, 2018;
- Our Current Reports on Form 8-K filed with the SEC on June 7, 2018, June 12, 2018, June 28, 2018, November 27, 2018, December 20, 2018 and January 16, 2019; and
- The description of our common stock contained in our Registration Statement on Form 8-A filed with the SEC on November 15, 2017, including any amendments or reports filed for the purpose of updating such description.

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You may request a copy of these filings, at no cost, by writing or telephoning us at the following address or telephone number:

Arsanis, Inc.
890 Winter Street, Suite 230
Waltham, MA 02451
(781) 819-5704

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the information incorporated by reference in this prospectus include “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Exchange Act. These statements are based on current expectations, estimates, forecasts and projections about the industry in which we operate and the beliefs and assumptions of our management. The words “anticipate,” “believe,” “continue” “could,” “estimate,” “expect,” “intend,” “may,” “might,” “plan,” “potential,” “predict,” “project,” “should,” “target,” “would,” and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. There are a number of important risks and uncertainties that could cause our actual results to differ materially from those indicated by forward-looking statements. We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. You are cautioned that these forward-looking statements are only predictions and are subject to risks, uncertainties and assumptions that are referenced in the section of any accompanying prospectus supplement entitled “Risk Factors.” You should also carefully review the risk factors and cautionary statements described in the other documents we file from time to time with the SEC, specifically our most recent Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K. We undertake no obligation to revise or update any forward-looking statements, except to the extent required by law.

PROSPECTUS SUMMARY

The following is a summary of our business and the offering of our securities under this prospectus. We urge you to read this entire prospectus, including the more detailed consolidated financial statements, notes to the consolidated financial statements and other information incorporated by reference from our other filings with the SEC or included in any applicable prospectus supplements. Investing in our securities involves risks. Therefore, carefully consider the risk factors in any prospectus supplements and in our most recent annual and quarterly filings with the SEC, as well as other information in this prospectus and any prospectus supplements and the documents incorporated by reference herein or therein, before purchasing our securities. Each of the risk factors could adversely affect our business, operating results and financial condition, as well as adversely affect the value of an investment in our securities.

About Arsanis, Inc.

We are a clinical-stage biopharmaceutical company focused on applying monoclonal antibody, or mAb, immunotherapies to address serious infectious diseases. We possess a deep understanding of the pathogenesis of infection, paired with access to what we believe to be some of the most advanced mAb discovery techniques and platforms available today. Our pipeline is comprised of mAbs targeting multiple serious bacterial and viral pathogens, including respiratory syncytial virus.

On November 26, 2018, we entered into a merger agreement with X4 Pharmaceuticals, Inc., or X4, under which a wholly owned subsidiary of Arsanis is expected to merge with and into X4 in an all-stock transaction. The merger would result in a combined company operating under the X4 Pharmaceuticals, Inc. name that will focus on the discovery, development and commercialization of novel therapeutics for the treatment of rare diseases. The merger is currently expected to close in the first quarter of 2019, subject to the approval of the stockholders of each company and the satisfaction or waiver of other customary conditions.

As required by Rule 3-05 and Article 11 of Regulation S-X, the financial information for X4 for the years ended December 31, 2017 and 2016 and the nine months ended September 30, 2018 and 2017, and the pro forma financial information related to the proposed merger, have been filed as Exhibits 99.1 and 99.2, respectively, to the registration statement of which this prospectus is a part and are included herein.

Our principal executive offices are located at 890 Winter Street, Waltham, Massachusetts 02451 and our telephone number is (781) 819-5704. We have a wholly owned subsidiary that is primarily focused on discovery research in Vienna, Austria (Arsanis Biosciences GmbH).

RISK FACTORS

Investing in our common stock involves a high degree of risk. Before you decide to invest in our common stock, you should carefully consider the risks described in the section captioned “Risk Factors” in our most recent Annual Report on Form 10-K, our most recent Quarterly Report on Form 10-Q and other filings we make with the Securities and Exchange Commission, or SEC, from time to time, which are incorporated by reference herein in their entirety, together with the other information in this prospectus and documents incorporated by reference in this prospectus. The risks described in our most recent Annual Report on Form 10-K, our most recent Quarterly Report on Form 10-Q and the other filings incorporated by reference herein are not the only ones facing our company. Additional risks and uncertainties may also impair our business operations. If any of the risks described in our most recent Annual Report on Form 10-K, our most recent Quarterly Report on Form 10-Q and the other filings incorporated by reference herein occurs, our business, financial condition, results of operations and future growth prospects could be harmed. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

USE OF PROCEEDS

We intend to use the net proceeds from the sale of any securities offered under this prospectus for general corporate purposes unless otherwise indicated in the applicable prospectus supplement. General corporate purposes may include research and development expenditures, the acquisition or in-licensing of other products, product candidates, companies or businesses, repayment and refinancing of debt, working capital and capital expenditures. We may temporarily invest such net proceeds in investment-grade, interest-bearing securities until they are used for their stated purpose. We have not determined the amount of net proceeds to be used specifically for such purposes. As a result, management will retain broad discretion over the allocation of net proceeds.

DESCRIPTION OF DEBT SECURITIES

We may offer debt securities which may be senior or subordinated. We refer to the senior debt securities and the subordinated debt securities collectively as debt securities. The following description summarizes the general terms and provisions of the debt securities. We will describe the specific terms of the debt securities and the extent, if any, to which the general provisions summarized below apply to any series of debt securities in the prospectus supplement relating to the series and any applicable free writing prospectus that we authorize to be delivered. When we refer to “the Company,” “we,” “our,” and “us” in this section, we mean Arsanis, Inc. excluding, unless the context otherwise requires or as otherwise expressly stated, our subsidiaries.

We may issue senior debt securities from time to time, in one or more series under a senior indenture to be entered into between us and a senior trustee to be named in a prospectus supplement, which we refer to as the senior trustee. We may issue subordinated debt securities from time to time, in one or more series under a subordinated indenture to be entered into between us and a subordinated trustee to be named in a prospectus supplement, which we refer to as the subordinated trustee. The forms of senior indenture and subordinated indenture are filed as exhibits to the registration statement of which this prospectus forms a part. The senior indenture and the subordinated indenture are referred to individually as an indenture and together as the indentures, and the senior trustee and the subordinated trustee are referred to individually as a trustee and together as the trustees. This section summarizes some of the provisions of the indentures and is qualified in its entirety by the specific text of the indentures, including definitions of terms used in the indentures. Wherever we refer to particular sections of, or defined terms in, the indentures, those sections or defined terms are incorporated by reference in this prospectus or the applicable prospectus supplement. You should review the indentures that are filed as exhibits to the registration statement of which this prospectus forms a part for additional information.

Neither indenture will limit the amount of debt securities that we may issue. The applicable indenture will provide that debt securities may be issued up to an aggregate principal amount authorized from time to time by us and may be payable in any currency or currency unit designated by us or in amounts determined by reference to an index.

General

The senior debt securities will constitute our unsecured and unsubordinated general obligations and will rank equally in right of payment with our other unsecured and unsubordinated obligations. The subordinated debt securities will constitute our unsecured and subordinated general obligations and will be junior in right of payment to our senior indebtedness (including senior debt securities), as described under the heading “— Certain Terms of the Subordinated Debt Securities—Subordination.” The debt securities will be structurally subordinated to all existing and future indebtedness and other liabilities of our subsidiaries unless such subsidiaries expressly guarantee such debt securities.

The debt securities will be our unsecured obligations. Any secured debt or other secured obligations will be effectively senior to the debt securities to the extent of the value of the assets securing such debt or other obligations.

The applicable prospectus supplement and/or free writing prospectus will include any additional or different terms of the debt securities of any series being offered, including the following terms:

- the title and type of the debt securities;
- whether the debt securities will be senior or subordinated debt securities, and, with respect to any subordinated debt securities, the terms on which they are subordinated;
- the initial aggregate principal amount of the debt securities;
- the price or prices at which we will sell the debt securities;

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- the maturity date or dates of the debt securities and the right, if any, to extend such date or dates;
- the rate or rates, if any, at which the debt securities will bear interest, or the method of determining such rate or rates;
- the date or dates from which such interest will accrue, the interest payment dates on which such interest will be payable or the method of determination of such dates;
- the right, if any, to extend the interest payment periods and the duration of that extension;
- the manner of paying principal and interest and the place or places where principal and interest will be payable;
- provisions for a sinking fund, purchase fund or other analogous fund, if any;
- any redemption dates, prices, obligations and restrictions on the debt securities;
- the currency, currencies or currency units in which the debt securities will be denominated and the currency, currencies or currency units in which principal and interest, if any, on the debt securities may be payable;
- any conversion or exchange features of the debt securities;
- whether the debt securities will be subject to the defeasance provisions in the indenture;
- whether the debt securities will be issued in definitive or global form or in definitive form only upon satisfaction of certain conditions;
- whether the debt securities will be guaranteed as to payment or performance;
- any special tax implications of the debt securities;
- any events of default or covenants in addition to or in lieu of those set forth in the indenture; and
- any other material terms of the debt securities.

When we refer to “principal” in this section with reference to the debt securities, we are also referring to “premium, if any.”

We may from time to time, without notice to or the consent of the holders of any series of debt securities, create and issue further debt securities of any such series ranking equally with the debt securities of such series in all respects (or in all respects other than (1) the payment of interest accruing prior to the issue date of such further debt securities or (2) the first payment of interest following the issue date of such further debt securities). Such further debt securities may be consolidated and form a single series with the debt securities of such series and have the same terms as to status, redemption or otherwise as the debt securities of such series.

You may present debt securities for exchange and you may present debt securities for transfer in the manner, at the places and subject to the restrictions set forth in the debt securities and the applicable prospectus supplement. We will provide you those services without charge, although you may have to pay any tax or other governmental charge payable in connection with any exchange or transfer, as set forth in the indenture.

Debt securities may bear interest at a fixed rate or a floating rate. Debt securities bearing no interest or interest at a rate that at the time of issuance is below the prevailing market rate (original issue discount securities) may be sold at a discount below their stated principal amount. U.S. federal income tax considerations applicable to any such discounted debt securities or to certain debt securities issued at par which are treated as having been issued at a discount for U.S. federal income tax purposes will be described in the applicable prospectus supplement.

We may issue debt securities with the principal amount payable on any principal payment date, or the amount of interest payable on any interest payment date, to be determined by reference to one or more currency

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exchange rates, securities or baskets of securities, commodity prices or indices. You may receive a payment of principal on any principal payment date, or a payment of interest on any interest payment date, that is greater than or less than the amount of principal or interest otherwise payable on such dates, depending on the value on such dates of the applicable currency, security or basket of securities, commodity or index. Information as to the methods for determining the amount of principal or interest payable on any date, the currencies, securities or baskets of securities, commodities or indices to which the amount payable on such date is linked and certain related tax considerations will be set forth in the applicable prospectus supplement.

Certain Terms of the Senior Debt Securities

Covenants. Unless we indicate otherwise in a prospectus supplement with respect to a particular series of senior debt securities, the senior debt securities will not contain any financial or restrictive covenants, including covenants restricting either us or any of our subsidiaries from incurring, issuing, assuming or guaranteeing any indebtedness secured by a lien on any of our or our subsidiaries' property or capital stock, or restricting either us or any of our subsidiaries from entering into sale and leaseback transactions.

Consolidation, Merger and Sale of Assets. Unless we indicate otherwise in a prospectus supplement with respect to a particular series of senior debt securities, we may not consolidate with or merge into any other person, in a transaction in which we are not the surviving corporation, or convey, transfer or lease our properties and assets substantially as an entirety to any person, in either case, unless:

- the successor entity, if any, is a U.S. corporation, limited liability company, partnership or trust;
- the successor entity assumes our obligations on the senior debt securities and under the senior indenture;
- immediately after giving effect to the transaction, no default or event of default shall have occurred and be continuing; and
- we have delivered to the senior trustee an officer's certificate and an opinion of counsel, each stating that the consolidation, merger, conveyance, transfer or lease and, if a supplemental indenture is required in connection with such transaction, such supplemental indenture, comply with the senior indenture and all conditions precedent provided for in the senior indenture relating to such transaction have been complied with.

The restrictions described in the bullets above do not apply (1) to our consolidation with or merging into one of our affiliates, if our board of directors determines in good faith that the purpose of the consolidation or merger is principally to change our state of incorporation or our form of organization to another form or (2) if we merge with or into a single direct or indirect wholly-owned subsidiary of ours.

The surviving business entity will succeed to, and be substituted for, us under the senior indenture and the senior debt securities and, except in the case of a lease, we shall be released from all obligations under the senior indenture and the senior debt securities.

No Protection in the Event of a Change in Control. Unless we indicate otherwise in a prospectus supplement with respect to a particular series of senior debt securities, the senior debt securities will not contain any provisions that may afford holders of the senior debt securities protection in the event we have a change in control or in the event of a highly leveraged transaction (whether or not such transaction results in a change in control).

Events of Default. Unless we indicate otherwise in a prospectus supplement with respect to a particular series of senior debt securities, the following are events of default under the senior indenture with respect to senior debt securities of each series:

- failure to pay interest on any senior debt securities of such series when due and payable, if that default continues for a period of 30 days (or such other period as may be specified for such series);

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- failure to pay principal on the senior debt securities of such series when due and payable whether at maturity, upon redemption, by declaration or otherwise (and, if specified for such series, the continuance of such failure for a specified period);
- default in the performance of or breach of any of our covenants or agreements in the senior indenture applicable to senior debt securities of such series, other than a covenant breach which is specifically dealt with elsewhere in the senior indenture, and that default or breach continues for a period of 90 days after we receive written notice from the trustee or from the holders of 25% or more in aggregate principal amount of the senior debt securities of such series;
- certain events of bankruptcy or insolvency, whether or not voluntary; and
- any other event of default provided for in such series of senior debt securities as may be specified in the applicable prospectus supplement.

The default by us under any other debt, including any other series of debt securities, is not a default under the senior indenture.

If an event of default other than an event of default specified in the fourth bullet point above occurs with respect to a series of senior debt securities and is continuing under the senior indenture, then, and in each such case, either the trustee or the holders of not less than 25% in aggregate principal amount of such series then outstanding under the senior indenture (each such series voting as a separate class) by written notice to us and to the trustee, if such notice is given by the holders, may, and the trustee at the request of such holders shall, declare the principal amount of and accrued interest on such series of senior debt securities to be immediately due and payable, and upon this declaration, the same shall become immediately due and payable.

If an event of default specified in the fourth bullet point above occurs and is continuing, the entire principal amount of and accrued interest on each series of senior debt securities then outstanding shall automatically become immediately due and payable.

Unless otherwise specified in the prospectus supplement relating to a series of senior debt securities originally issued at a discount, the amount due upon acceleration shall include only the original issue price of the senior debt securities, the amount of original issue discount accrued to the date of acceleration and accrued interest, if any.

Upon certain conditions, declarations of acceleration may be rescinded and annulled and past defaults may be waived by the holders of a majority in aggregate principal amount of all the senior debt securities of such series affected by the default, each series voting as a separate class. Furthermore, subject to various provisions in the senior indenture, the holders of a majority in aggregate principal amount of a series of senior debt securities, by notice to the trustee, may waive a continuing default or event of default with respect to such senior debt securities and its consequences, except a default in the payment of principal of or interest on such senior debt securities (other than any such default in payment resulting solely from an acceleration of the senior debt securities) or in respect of a covenant or provision of the senior indenture which cannot be modified or amended without the consent of the holders of each such senior debt security. Upon any such waiver, such default shall cease to exist, and any event of default with respect to such senior debt securities shall be deemed to have been cured, for every purpose of the senior indenture; but no such waiver shall extend to any subsequent or other default or event of default or impair any right consequent thereto.

The holders of a majority in aggregate principal amount of a series of senior debt securities may direct the time, method and place of conducting any proceeding for any remedy available to the trustee or exercising any trust or power conferred on the trustee with respect to such senior debt securities. However, the trustee may refuse to follow any direction that conflicts with law or the senior indenture, that may involve the trustee in personal liability or that the trustee determines in good faith may be unduly prejudicial to the rights of holders of

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such series of senior debt securities not joining in the giving of such direction and may take any other action it deems proper that is not inconsistent with any such direction received from holders of such series of senior debt securities. A holder may not pursue any remedy with respect to the senior indenture or any series of senior debt securities unless:

- the holder gives the trustee written notice of a continuing event of default;
- the holders of at least 25% in aggregate principal amount of such series of senior debt securities make a written request to the trustee to pursue the remedy in respect of such event of default;
- the requesting holder or holders offer the trustee indemnity satisfactory to the trustee against any costs, liability or expense;
- the trustee does not comply with the request within 60 days after receipt of the request and the offer of indemnity; and
- during such 60-day period, the holders of a majority in aggregate principal amount of such series of senior debt securities do not give the trustee a direction that is inconsistent with the request.

These limitations, however, do not apply to the right of any holder of a senior debt security of any affected series to receive payment of the principal of and interest on such senior debt security in accordance with the terms of such debt security, or to bring suit for the enforcement of any such payment in accordance with the terms of such debt security, on or after the due date for the senior debt securities, which right shall not be impaired or affected without the consent of the holder.

The senior indenture requires certain of our officers to certify, on or before a fixed date in each year in which any senior debt security is outstanding, as to their knowledge of our compliance with all covenants, agreements and conditions under the senior indenture.

Satisfaction and Discharge. We can satisfy and discharge our obligations to holders of any series of debt securities if:

- we have paid or caused to be paid the principal of and interest on all senior debt securities of such series (with certain limited exceptions) when due and payable; or
- we deliver to the senior trustee for cancellation all senior debt securities of such series theretofore authenticated under the senior indenture (with certain limited exceptions); or
- all senior debt securities of such series have become due and payable or will become due and payable within one year (or are to be called for redemption within one year under arrangements satisfactory to the senior trustee) and we deposit in trust an amount of cash or a combination of cash and U.S. government or U.S. government agency obligations (or in the case of senior debt securities denominated in a foreign currency, foreign government securities or foreign government agency securities) sufficient to make interest, principal and any other payments on the debt securities of that series on their various due dates;

and if, in any such case, we also pay or cause to be paid all other sums payable under the senior indenture, as and when the same shall be due and payable and we deliver to the senior trustee an officer's certificate and an opinion of counsel, each stating that these conditions have been satisfied.

Under current U.S. federal income tax law, the deposit and our legal release from the debt securities would be treated as though we took back your debt securities and gave you your share of the cash and debt securities or bonds deposited in trust. In that event, you could recognize gain or loss on the debt securities you give back to us. Purchasers of the debt securities should consult their own advisers with respect to the tax consequences to them of such deposit and discharge, including the applicability and effect of tax laws other than the U.S. federal income tax law.

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Defeasance. Unless the applicable prospectus supplement provides otherwise, the following discussion of legal defeasance and covenant defeasance will apply to any series of debt securities issued under the indentures.

Legal Defeasance. We can legally release ourselves from any payment or other obligations on the debt securities of any series (called “legal defeasance”) if certain conditions are met, including the following:

- We deposit in trust for your benefit and the benefit of all other direct holders of the debt securities of the same series cash or a combination of cash and U.S. government or U.S. government agency obligations (or, in the case of senior debt securities denominated in a foreign currency, foreign government or foreign government agency obligations) that will generate enough cash to make interest, principal and any other payments on the debt securities of that series on their various due dates.
- There is a change in current U.S. federal income tax law or an IRS ruling that lets us make the above deposit without causing you to be taxed on the debt securities any differently than if we did not make the deposit and instead repaid the debt securities ourselves when due. Under current U.S. federal income tax law, the deposit and our legal release from the debt securities would be treated as though we took back your debt securities and gave you your share of the cash and debt securities or bonds deposited in trust. In that event, you could recognize gain or loss on the debt securities you give back to us.
- We deliver to the trustee a legal opinion of our counsel confirming the tax law change or ruling described above.

If we accomplish legal defeasance, as described above, you would have to rely solely on the trust deposit for repayment of the debt securities. You could not look to us for repayment in the event of any shortfall.

Covenant Defeasance. Without any change in current U.S. federal tax law, we can make the same type of deposit described above and be released from some of the covenants in the debt securities (called “covenant defeasance”). In that event, you would lose the protection of those covenants but would gain the protection of having money and securities set aside in trust to repay the debt securities. In order to achieve covenant defeasance, we must do the following (among other things):

- We must deposit in trust for your benefit and the benefit of all other direct holders of the debt securities of the same series cash or a combination of cash and U.S. government or U.S. government agency obligations (or, in the case of senior debt securities denominated in a foreign currency, foreign government or foreign government agency obligations) that will generate enough cash to make interest, principal and any other payments on the debt securities of that series on their various due dates.
- We must deliver to the trustee a legal opinion of our counsel confirming that under current U.S. federal income tax law we may make the above deposit without causing you to be taxed on the debt securities any differently than if we did not make the deposit and instead repaid the debt securities ourselves when due.

If we accomplish covenant defeasance, you could still look to us for repayment of the debt securities if there were a shortfall in the trust deposit. In fact, if one of the events of default occurred (such as our bankruptcy) and the debt securities become immediately due and payable, there may be such a shortfall. Depending on the events causing the default, you may not be able to obtain payment of the shortfall.

Modification and Waiver. We and the trustee may amend or supplement the senior indenture or the senior debt securities of any series without the consent of any holder:

- to convey, transfer, assign, mortgage or pledge any assets as security for the senior debt securities of one or more series;
- to evidence the succession of a corporation, limited liability company, partnership or trust to us, and the assumption by such successor of our covenants, agreements and obligations under the senior

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- indenture or to otherwise comply with the covenant relating to mergers, consolidations and sales of assets;
- to comply with requirements of the SEC in order to effect or maintain the qualification of the senior indenture under the Trust Indenture Act of 1939, as amended (the “Trust Indenture Act”);
- to add to our covenants such new covenants, restrictions, conditions or provisions for the protection of the holders, and to make the occurrence, or the occurrence and continuance, of a default in any such additional covenants, restrictions, conditions or provisions an event of default;
- to cure any ambiguity, defect or inconsistency in the senior indenture or in any supplemental indenture or to conform the senior indenture or the senior debt securities to the description of senior debt securities of such series set forth in this prospectus or any applicable prospectus supplement;
- to provide for or add guarantors with respect to the senior debt securities of any series;
- to establish the form or forms or terms of the senior debt securities as permitted by the senior indenture;
- to evidence and provide for the acceptance of appointment under the senior indenture by a successor trustee, or to make such changes as shall be necessary to provide for or facilitate the administration of the trusts in the senior indenture by more than one trustee;
- to add to, change or eliminate any of the provisions of the senior indenture in respect of one or more series of senior debt securities, provided that any such addition, change or elimination shall (a) neither (1) apply to any senior debt security of any series created prior to the execution of such supplemental indenture and entitled to the benefit of such provision nor (2) modify the rights of the holder of any such senior debt security with respect to such provision or (b) become effective only when there is no senior debt security described in clause (a)(1) outstanding;
- to make any change to the senior debt securities of any series so long as no senior debt securities of such series are outstanding; or
- to make any change that does not adversely affect the rights of any holder in any material respect.

Other amendments and modifications of the senior indenture or the senior debt securities issued may be made, and our compliance with any provision of the senior indenture with respect to any series of senior debt securities may be waived, with the consent of the holders of a majority of the aggregate principal amount of the outstanding senior debt securities of each series affected by the amendment or modification (voting as separate series); provided, however, that each affected holder must consent to any modification, amendment or waiver that:

- extends the final maturity of any senior debt securities of such series;
- reduces the principal amount of any senior debt securities of such series;
- reduces the rate, or extends the time for payment of, interest on any senior debt securities of such series;
- reduces the amount payable upon the redemption of any senior debt securities of such series;
- changes the currency of payment of principal of or interest on any senior debt securities of such series;
- reduces the principal amount of original issue discount securities payable upon acceleration of maturity or the amount provable in bankruptcy;
- waives a continuing default in the payment of principal of or interest on the senior debt securities (other than any such default in payment resulting solely from an acceleration of the senior debt securities);
- changes the provisions relating to the waiver of past defaults or impairs the right of holders to receive payment or to institute suit for the enforcement of any payment or conversion of any senior debt securities of such series on or after the due date therefor;

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- modifies any of the provisions of these restrictions on amendments and modifications, except to increase any required percentage or to provide that certain other provisions cannot be modified or waived without the consent of the holder of each senior debt security of such series affected by the modification;
- adversely affects the right to convert or exchange senior debt securities into common stock or other property in accordance with the terms of the senior debt securities; or
- reduces the above-stated percentage of outstanding senior debt securities of such series whose holders must consent to a supplemental indenture or modifies or amends or waives certain provisions of or defaults under the senior indenture.

It shall not be necessary for the holders to approve the particular form of any proposed amendment, supplement or waiver, but it shall be sufficient if the holders' consent approves the substance thereof. After an amendment, supplement or waiver of the senior indenture in accordance with the provisions described in this section becomes effective, the trustee must give to the holders affected thereby certain notice briefly describing the amendment, supplement or waiver. Any failure by the trustee to give such notice, or any defect therein, shall not, however, in any way impair or affect the validity of any such amendment, supplemental indenture or waiver.

No Personal Liability of Incorporators, Stockholders, Officers, Directors. The senior indenture provides that no recourse shall be had under any obligation, covenant or agreement of ours in the senior indenture or any supplemental indenture, or in any of the senior debt securities or because of the creation of any indebtedness represented thereby, against any of our incorporators, stockholders, officers or directors, past, present or future, or of any predecessor or successor entity thereof under any law, statute or constitutional provision or by the enforcement of any assessment or by any legal or equitable proceeding or otherwise. Each holder, by accepting the senior debt securities, waives and releases all such liability.

Concerning the Trustee. The senior indenture provides that, except during the continuance of an event of default, the trustee will not be liable except for the performance of such duties as are specifically set forth in the senior indenture. If an event of default has occurred and is continuing, the trustee will exercise such rights and powers vested in it under the senior indenture and will use the same degree of care and skill in its exercise as a prudent person would exercise under the circumstances in the conduct of such person's own affairs.

The senior indenture and the provisions of the Trust Indenture Act incorporated by reference therein contain limitations on the rights of the trustee thereunder, should it become a creditor of ours or any of our subsidiaries, to obtain payment of claims in certain cases or to realize on certain property received by it in respect of any such claims, as security or otherwise. The trustee is permitted to engage in other transactions, provided that if it acquires any conflicting interest (as defined in the Trust Indenture Act), it must eliminate such conflict or resign.

We may have normal banking relationships with the senior trustee in the ordinary course of business.

Unclaimed Funds. All funds deposited with the trustee or any paying agent for the payment of principal, premium, interest or additional amounts in respect of the senior debt securities that remain unclaimed for two years after the date upon which such amounts became due and payable will be repaid to us. Thereafter, any right of any holder of senior debt securities to such funds shall be enforceable only against us, and the trustee and paying agents will have no liability therefor.

Governing Law. The senior indenture and the senior debt securities will be governed by, and construed in accordance with, the internal laws of the State of New York.

Certain Terms of the Subordinated Debt Securities

Other than the terms of the subordinated indenture and subordinated debt securities relating to subordination or otherwise as described in the prospectus supplement relating to a particular series of subordinated debt

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securities, the terms of the subordinated indenture and subordinated debt securities are identical in all material respects to the terms of the senior indenture and senior debt securities.

Additional or different subordination terms may be specified in the prospectus supplement applicable to a particular series.

Subordination. The indebtedness evidenced by the subordinated debt securities is subordinate to the prior payment in full of all of our senior indebtedness, as defined in the subordinated indenture. During the continuance beyond any applicable grace period of any default in the payment of principal, premium, interest or any other payment due on any of our senior indebtedness, we may not make any payment of principal of or interest on the subordinated debt securities (except for certain sinking fund payments). In addition, upon any payment or distribution of our assets upon any dissolution, winding-up, liquidation or reorganization, the payment of the principal of and interest on the subordinated debt securities will be subordinated to the extent provided in the subordinated indenture in right of payment to the prior payment in full of all our senior indebtedness. Because of this subordination, if we dissolve or otherwise liquidate, holders of our subordinated debt securities may receive less, ratably, than holders of our senior indebtedness. The subordination provisions do not prevent the occurrence of an event of default under the subordinated indenture.

The term “senior indebtedness” of a person means with respect to such person the principal of, premium, if any, interest on, and any other payment due pursuant to any of the following, whether outstanding on the date of the subordinated indenture or incurred by that person in the future:

- all of the indebtedness of that person for money borrowed;
- all of the indebtedness of that person evidenced by notes, debentures, bonds or other securities sold by that person for money;
- all of the lease obligations that are capitalized on the books of that person in accordance with generally accepted accounting principles;
- all indebtedness of others of the kinds described in the first two bullet points above and all lease obligations of others of the kind described in the third bullet point above that the person, in any manner, assumes or guarantees or that the person in effect guarantees through an agreement to purchase, whether that agreement is contingent or otherwise; and
- all renewals, extensions or refundings of indebtedness of the kinds described in the first, second or fourth bullet point above and all renewals or extensions of leases of the kinds described in the third or fourth bullet point above;

unless, in the case of any particular indebtedness, renewal, extension or refunding, the instrument creating or evidencing it or the assumption or guarantee relating to it expressly provides that such indebtedness, renewal, extension or refunding is not superior in right of payment to the subordinated debt securities. Our senior debt securities constitute senior indebtedness for purposes of the subordinated indenture.

DESCRIPTION OF COMMON STOCK AND PREFERRED STOCK

General

Our authorized capital stock consists of 200,000,000 shares of common stock, par value \$0.001 per share, and 10,000,000 shares of preferred stock, par value \$0.001 per share, all of which preferred stock is undesignated. The following description of our capital stock and provisions of our restated certificate of incorporation and amended and restated bylaws are summaries and are qualified by reference to our restated certificate of incorporation and our amended and restated bylaws, copies of which are filed with the SEC as exhibits to our registration statement of which this prospectus forms a part.

Common Stock

Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. Each election of directors by our stockholders will be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of outstanding preferred stock.

In the event of our liquidation or dissolution, the holders of our common stock are entitled to receive proportionately all assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any of our outstanding preferred stock. Holders of our common stock have no pre-emptive, subscription, redemption or conversion rights. The rights, preferences and privileges of holders of our common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of our preferred stock that we may designate and issue in the future.

Preferred Stock

We are authorized to issue “blank check” preferred stock, which may be issued in one or more series upon authorization of our board of directors. Our board of directors is authorized to fix the designations, powers, preferences and the relative, participating, optional or other special rights and any qualifications, limitations and restrictions of the shares of each series of preferred stock. The authorized shares of our preferred stock are available for issuance without further action by our stockholders, unless such action is required by applicable law or the rules of any stock exchange on which our securities may be listed. If the approval of our stockholders is not required for the issuance of shares of our preferred stock, our board may determine not to seek stockholder approval. The specific terms of any series of preferred stock offered pursuant to this prospectus will be described in the prospectus supplement relating to that series of preferred stock.

A series of our preferred stock could, depending on the terms of such series, impede the completion of a merger, tender offer or other takeover attempt. Our board of directors will make any determination to issue preferred shares based upon its judgment as to the best interests of our stockholders. Our directors, in so acting, could issue preferred stock having terms that could discourage an acquisition attempt through which an acquirer may be able to change the composition of our board of directors, including a tender offer or other transaction that some, or a majority, of our stockholders might believe to be in their best interests or in which stockholders might receive a premium for their stock over the then-current market price of the stock.

The preferred stock has the terms described below unless otherwise provided in the prospectus supplement relating to a particular series of preferred stock. You should read the prospectus supplement relating to the particular series of preferred stock being offered for specific terms, including:

- the designation and stated value per share of the preferred stock and the number of shares offered;
- the amount of liquidation preference per share;

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- the price at which the preferred stock will be issued;
- the dividend rate, or method of calculation of dividends, the dates on which dividends will be payable, whether dividends will be cumulative or noncumulative and, if cumulative, the dates from which dividends will commence to accumulate;
- any redemption or sinking fund provisions;
- if other than the currency of the United States, the currency or currencies including composite currencies in which the preferred stock is denominated and/or in which payments will or may be payable;
- any conversion provisions; and
- any other rights, preferences, privileges, limitations and restrictions on the preferred stock.

The preferred stock will, when issued, be fully paid and non-assessable. Unless otherwise specified in the prospectus supplement, each series of preferred stock will rank equally as to dividends and liquidation rights in all respects with each other series of preferred stock. The rights of holders of shares of each series of preferred stock will be subordinate to those of our general creditors.

Rank. Unless otherwise specified in the prospectus supplement, the preferred stock will, with respect to dividend rights and rights upon our liquidation, dissolution or winding up of our affairs, rank:

- senior to our common stock and to all equity securities ranking junior to such preferred stock with respect to dividend rights or rights upon our liquidation, dissolution or winding up of our affairs;
- on a parity with all equity securities issued by us, the terms of which specifically provide that such equity securities rank on a parity with the preferred stock with respect to dividend rights or rights upon our liquidation, dissolution or winding up of our affairs; and
- junior to all equity securities issued by us, the terms of which specifically provide that such equity securities rank senior to the preferred stock with respect to dividend rights or rights upon our liquidation, dissolution or winding up of our affairs.

The term “equity securities” does not include convertible debt securities.

Dividends. Holders of the preferred stock of each series will be entitled to receive, when, as and if declared by our board of directors, cash dividends at such rates and on such dates described in the prospectus supplement. Different series of preferred stock may be entitled to dividends at different rates or based on different methods of calculation. The dividend rate may be fixed or variable or both. Dividends will be payable to the holders of record as they appear on our stock books on record dates fixed by our board of directors, as specified in the applicable prospectus supplement.

Dividends on any series of preferred stock may be cumulative or noncumulative, as described in the applicable prospectus supplement. If our board of directors does not declare a dividend payable on a dividend payment date on any series of noncumulative preferred stock, then the holders of that noncumulative preferred stock will have no right to receive a dividend for that dividend payment date, and we will have no obligation to pay the dividend accrued for that period, whether or not dividends on that series are declared payable on any future dividend payment dates. Dividends on any series of cumulative preferred stock will accrue from the date we initially issue shares of such series or such other date specified in the applicable prospectus supplement.

No dividends may be declared or paid or funds set apart for the payment of any dividends on any parity securities unless full dividends have been paid or set apart for payment on the preferred stock. If full dividends are not paid, the preferred stock will share dividends pro rata with the parity securities.

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No dividends may be declared or paid or funds set apart for the payment of dividends on any junior securities unless full dividends for all dividend periods terminating on or prior to the date of the declaration or payment will have been paid or declared and a sum sufficient for the payment set apart for payment on the preferred stock.

Liquidation Preference. Upon any voluntary or involuntary liquidation, dissolution or winding up of our affairs, then, before we make any distribution or payment to the holders of any common stock or any other class or series of our capital stock ranking junior to the preferred stock in the distribution of assets upon any liquidation, dissolution or winding up of our affairs, the holders of each series of preferred stock shall be entitled to receive out of assets legally available for distribution to stockholders, liquidating distributions in the amount of the liquidation preference per share set forth in the prospectus supplement, plus any accrued and unpaid dividends thereon. Such dividends will not include any accumulation in respect of unpaid noncumulative dividends for prior dividend periods. Unless otherwise specified in the prospectus supplement, after payment of the full amount of their liquidating distributions, the holders of preferred stock will have no right or claim to any of our remaining assets. Upon any such voluntary or involuntary liquidation, dissolution or winding up, if our available assets are insufficient to pay the amount of the liquidating distributions on all outstanding preferred stock and the corresponding amounts payable on all other classes or series of our capital stock ranking on parity with the preferred stock and all other such classes or series of shares of capital stock ranking on parity with the preferred stock in the distribution of assets, then the holders of the preferred stock and all other such classes or series of capital stock will share ratably in any such distribution of assets in proportion to the full liquidating distributions to which they would otherwise be entitled.

Upon any such liquidation, dissolution or winding up and if we have made liquidating distributions in full to all holders of preferred stock, we will distribute our remaining assets among the holders of any other classes or series of capital stock ranking junior to the preferred stock according to their respective rights and preferences and, in each case, according to their respective number of shares. For such purposes, our consolidation or merger with or into any other corporation, trust or entity, or the sale, lease or conveyance of all or substantially all of our property or assets will not be deemed to constitute a liquidation, dissolution or winding up of our affairs.

Redemption. If so provided in the applicable prospectus supplement, the preferred stock will be subject to mandatory redemption or redemption at our option, as a whole or in part, in each case upon the terms, at the times and at the redemption prices set forth in such prospectus supplement.

The prospectus supplement relating to a series of preferred stock that is subject to mandatory redemption will specify the number of shares of preferred stock that shall be redeemed by us in each year commencing after a date to be specified, at a redemption price per share to be specified, together with an amount equal to all accrued and unpaid dividends thereon to the date of redemption. Unless the shares have a cumulative dividend, such accrued dividends will not include any accumulation in respect of unpaid dividends for prior dividend periods. We may pay the redemption price in cash or other property, as specified in the applicable prospectus supplement. If the redemption price for preferred stock of any series is payable only from the net proceeds of the issuance of shares of our capital stock, the terms of such preferred stock may provide that, if no such shares of our capital stock shall have been issued or to the extent the net proceeds from any issuance are insufficient to pay in full the aggregate redemption price then due, such preferred stock shall automatically and mandatorily be converted into the applicable shares of our capital stock pursuant to conversion provisions specified in the applicable prospectus supplement. Notwithstanding the foregoing, we will not redeem any preferred stock of a series unless:

- if that series of preferred stock has a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full cumulative dividends on the preferred stock for all past dividend periods and the then current dividend period; or
- if such series of preferred stock does not have a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full dividends for the then current dividend period.

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In addition, we will not acquire any preferred stock of a series unless:

- if that series of preferred stock has a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full cumulative dividends on all outstanding shares of such series of preferred stock for all past dividend periods and the then current dividend period; or
- if that series of preferred stock does not have a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full dividends on the preferred stock of such series for the then current dividend period.

However, at any time we may purchase or acquire preferred stock of that series (1) pursuant to a purchase or exchange offer made on the same terms to holders of all outstanding preferred stock of such series or (2) by conversion into or exchange for shares of our capital stock ranking junior to the preferred stock of such series as to dividends and upon liquidation.

If fewer than all of the outstanding shares of preferred stock of any series are to be redeemed, we will determine the number of shares that may be redeemed pro rata from the holders of record of such shares in proportion to the number of such shares held or for which redemption is requested by such holder or by any other equitable manner that we determine. Such determination will reflect adjustments to avoid redemption of fractional shares.

Unless otherwise specified in the prospectus supplement, we will mail notice of redemption at least 30 days but not more than 60 days before the redemption date to each holder of record of preferred stock to be redeemed at the address shown on our stock transfer books. Each notice shall state:

- the redemption date;
- the number of shares and series of preferred stock to be redeemed;
- the redemption price;
- the place or places where certificates for such preferred stock are to be surrendered for payment of the redemption price;
- that dividends on the shares to be redeemed will cease to accrue on such redemption date;
- the date on which the holder's conversion rights, if any, as to such shares shall terminate; and
- the specific number of shares to be redeemed from each such holder if fewer than all the shares of any series are to be redeemed.

If notice of redemption has been given and we have set aside the funds necessary for such redemption in trust for the benefit of the holders of any shares called for redemption, then from and after the redemption date, dividends will cease to accrue on such shares, and all rights of the holders of such shares will terminate, except the right to receive the redemption price.

Voting Rights. Holders of preferred stock will not have any voting rights, except as required by law or as indicated in the applicable prospectus supplement.

Unless otherwise provided for under the terms of any series of preferred stock, no consent or vote of the holders of shares of preferred stock or any series thereof shall be required for any amendment to our certificate of incorporation that would increase the number of authorized shares of preferred stock or the number of authorized shares of any series thereof or decrease the number of authorized shares of preferred stock or the number of authorized shares of any series thereof (but not below the number of authorized shares of preferred stock or such series, as the case may be, then outstanding).

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Conversion Rights. The terms and conditions, if any, upon which any series of preferred stock is convertible into our common stock will be set forth in the applicable prospectus supplement relating thereto. Such terms will include the number of shares of common stock into which the shares of preferred stock are convertible, the conversion price, rate or manner of calculation thereof, the conversion period, provisions as to whether conversion will be at our option or at the option of the holders of the preferred stock, the events requiring an adjustment of the conversion price and provisions affecting conversion in the event of the redemption.

Transfer Agent and Registrar. The transfer agent and registrar for the preferred stock will be set forth in the applicable prospectus supplement.

Delaware Anti-Takeover Law and Certain Charter and Bylaw Provisions

Delaware Law

We are subject to Section 203 of the Delaware General Corporation Law. Subject to certain exceptions, Section 203 prevents a publicly held Delaware corporation from engaging in a “business combination” with any “interested stockholder” for three years following the date that the person became an interested stockholder, unless either the interested stockholder attained such status with the approval of our board of directors, the business combination is approved by our board of directors and stockholders in a prescribed manner or the interested stockholder acquired at least 85% of our outstanding voting stock in the transaction in which it became an interested stockholder. A “business combination” includes, among other things, a merger or consolidation involving us and the “interested stockholder” and the sale of more than 10% of our assets. In general, an “interested stockholder” is any entity or person beneficially owning 15% or more of our outstanding voting stock and any entity or person affiliated with or controlling or controlled by such entity or person.

Staggered Board; Removal of Directors

Our restated certificate of incorporation and amended and restated bylaws divide our board of directors into three classes with staggered three-year terms. In addition, our restated certificate of incorporation and our amended and restated bylaws provide that directors may be removed only for cause and only by the affirmative vote of the holders of 75% of our shares of capital stock present in person or by proxy and entitled to vote. Under our restated certificate of incorporation and amended and restated bylaws, any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, may be filled only by vote of a majority of our directors then in office. Furthermore, our restated certificate of incorporation provides that the authorized number of directors may be changed only by the resolution of our board of directors. The classification of our board of directors and the limitations on the ability of our stockholders to remove directors, change the authorized number of directors and fill vacancies could make it more difficult for a third party to acquire, or discourage a third party from seeking to acquire, control of our company.

Stockholder Action; Special Meeting of Stockholders; Advance Notice Requirements for Stockholder Proposals and Director Nominations

Our restated certificate of incorporation and amended and restated bylaws provide that any action required or permitted to be taken by our stockholders at an annual meeting or special meeting of stockholders may only be taken if it is properly brought before such meeting and may not be taken by written action in lieu of a meeting. Our restated certificate of incorporation and our amended and restated bylaws also provide that, except as otherwise required by law, special meetings of the stockholders can only be called by the chairman of our board of directors, our chief executive officer or our board of directors. In addition, our amended and restated bylaws establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of stockholders, including proposed nominations of candidates for election to our board of directors. Stockholders at an annual meeting may only consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of our board of directors, or by a stockholder of record on the record

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date for the meeting who is entitled to vote at the meeting and who has delivered timely written notice in proper form to our secretary of the stockholder's intention to bring such business before the meeting. These provisions could have the effect of delaying until the next stockholder meeting stockholder actions that are favored by the holders of a majority of our outstanding voting securities. These provisions also could discourage a third party from making a tender offer for our common stock because even if the third party acquired a majority of our outstanding voting stock, it would be able to take action as a stockholder, such as electing new directors or approving a merger, only at a duly called stockholders meeting and not by written consent.

Super-Majority Voting

The Delaware General Corporation Law provides generally that the affirmative vote of a majority of the shares entitled to vote on any matter is required to amend a corporation's certificate of incorporation or bylaws unless a corporation's certificate of incorporation or bylaws, as the case may be, requires a greater percentage. Our amended and restated bylaws may be amended or repealed by a majority vote of our board of directors or the affirmative vote of the holders of at least 75% of the votes that all our stockholders would be entitled to cast in any annual election of directors. In addition, the affirmative vote of the holders of at least 75% of the votes that all our stockholders would be entitled to cast in any election of directors is required to amend or repeal or to adopt any provisions inconsistent with any of the provisions of our restated certificate of incorporation described above.

Exclusive Forum Selection

Our restated certificate of incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware shall be the sole and exclusive forum for (1) any derivative action or proceeding brought on behalf of our company, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, employees or stockholders to our company or our stockholders, (3) any action asserting a claim arising pursuant to any provision of the General Corporation Law of the State of Delaware or as to which the General Corporation Law of the State of Delaware confers jurisdiction on the Court of Chancery of the State of Delaware, or (4) any action asserting a claim arising pursuant to any provision of our restated certificate of incorporation or amended and restated bylaws (in each case, as they may be amended from time to time) or governed by the internal affairs doctrine. Although our restated certificate of incorporation contains the choice of forum provision described above, it is possible that a court could rule that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable.

Registration Rights

Private Placement Registration Rights

Under the terms of a share purchase agreement with New Enterprise Associates 16, L.P., or NEA, we have granted NEA the right to require us to register 2,000,000 shares of our common stock under the Securities Act, at any time, subject to specified limitations set forth in such share purchase agreement. We are not obligated to file a registration statement pursuant to this provision on more than two occasions. After registration pursuant to these rights, the registrable securities will become freely tradable without restriction under the Securities Act.

Expenses

Pursuant to the share purchase agreement, we are required to pay all registration expenses, including all registration, filing and printing fees, issuer counsel and accounting fees and expenses, costs and expenses associated with clearing the shares for sale under applicable Blue Sky laws, listing fees, expenses incurred by us in connection with any "road show," and reasonable fees, charges and disbursements of counsel to NEA, but excluding underwriting discounts or commissions and fees with respect to the shares being sold.

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The share purchase agreement contains customary cross-indemnification provisions, pursuant to which we are obligated to indemnify NEA in the event of material misstatements or omissions in the registration statement attributable to us, and NEA is obligated to indemnify us for material misstatements or omissions in the registration statement attributable to NEA.

Second Amended and Restated Investors' Rights Agreement

We have entered into a second amended and restated investors' rights agreement, as amended, with certain holders of our common stock. Under the terms of such investors' rights agreement, these holders have the right to require us to register their shares under the Securities Act, under specified circumstances. We refer to the shares with these registration rights as registrable securities. After registration pursuant to these rights, the registrable securities will become freely tradable without restriction under the Securities Act.

Demand and Form S-3 Registration Rights

Subject to specified limitations set forth in the investors' rights agreement, at any time, the holders of at least 25% of the then outstanding registrable securities may demand that we register registrable securities then outstanding under the Securities Act for purposes of a public offering having an aggregate offering price to the public of not less than \$10.0 million. We are not obligated to file a registration statement pursuant to this provision on more than two occasions.

In addition, subject to specified limitations set forth in the investors' rights agreement, at any time after we become eligible to file a registration statement on Form S-3, holders of the registrable securities then outstanding may request that we register their registrable securities on Form S-3 for purposes of a public offering for which the reasonably anticipated aggregate offering price to the public would exceed \$1.0 million. We are not obligated to file a registration statement pursuant to this provision on more than two occasions in any 12-month period.

Incidental Registration Rights

If, at any time we propose to register for our own account any of our securities under the Securities Act, the holders of registrable securities will be entitled to notice of the registration and, subject to specified exceptions, have the right to require us to use our reasonable best efforts to register all or a portion of the registrable securities then held by them in that registration.

In the event that any registration in which the holders of registrable securities participate pursuant to our investors' rights agreement is an underwritten public offering, we have agreed to enter into an underwriting agreement in usual and customary form and use our reasonable best efforts to facilitate such offering.

Expenses

Pursuant to the investors' rights agreement, we are required to pay all registration expenses, including all registration and filing fees, exchange listing fees, printing expenses, fees and expenses of one counsel selected by the selling stockholders to represent the selling stockholders, state Blue Sky fees and expenses and the expense of any special audits incident to or required by any such registration, but excluding underwriting discounts, selling commissions and the fees and expenses of the selling stockholders' own counsel (other than the counsel selected to represent all selling stockholders).

The investors' rights agreement contains customary cross-indemnification provisions, pursuant to which we are obligated to indemnify the selling stockholders in the event of material misstatements or omissions in the registration statement attributable to us or any violation or alleged violation whether by action or inaction by us under the Securities Act, the Exchange Act, any state securities or Blue Sky law or any rule or regulation promulgated under the Securities Act, the Exchange Act or any state securities or Blue Sky law in connection with such registration statement or the qualification or compliance of the offering, and they are obligated to indemnify us for material misstatements or omissions in the registration statement attributable to them.

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Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare Trust Company, N.A.

Nasdaq Global Market

Our common stock is listed on the Nasdaq Global Market under the symbol “ASNS.”

DESCRIPTION OF UNITS

The following description, together with the additional information we may include in any applicable prospectus supplements, summarizes the material terms and provisions of the units that we may offer under this prospectus. While the terms summarized below will apply generally to any units that we may offer, we will describe the particular terms of any series of units in more detail in the applicable prospectus supplement. If we indicate in the prospectus supplement, the terms of any units offered under that prospectus supplement may differ from the terms described below. Specific unit agreements will contain additional important terms and provisions and will be incorporated by reference as an exhibit to the registration statement that includes this prospectus.

General

We may issue units consisting of debt securities, common stock, preferred stock, or warrants for the purchase of debt securities, common stock and/or preferred stock in one or more series, in any combination. Each unit will be issued so that the holder of the unit is also the holder of each security included in the unit. Thus, the holder of a unit will have the rights and obligations of a holder of each included security. The unit agreement under which a unit is issued may provide that the securities included in the unit may not be held or transferred separately, at any time or at any time before a specified date.

We will describe in the applicable prospectus supplement the terms of the series of units being offered, including:

- the designation and terms of the units and of the securities comprising the units, including whether and under what circumstances those securities may be held or transferred separately;
- any provisions of the governing unit agreement that differ from those described below; and
- any provisions for the issuance, payment, settlement, transfer or exchange of the units or of the securities comprising the units.

We may issue units in such amounts and in such numbers of distinct series as we determine.

The provisions described in this section, as well as those described under “Description of Common Stock and Preferred Stock” and “Description of Warrants” will apply to each unit, as applicable, and to any common stock, preferred stock or warrant included in each unit, as applicable.

Unit Agent

The name and address of the unit agent for any units we offer will be set forth in the applicable prospectus supplement.

Enforceability of Rights by Holders of Units

Each unit agent will act solely as our agent under the applicable unit agreement and will not assume any obligation or relationship of agency or trust with any holder of any unit. A single bank or trust company may act as unit agent for more than one series of units. A unit agent will have no duty or responsibility in case of any default by us under the applicable unit agreement or unit, including any duty or responsibility to initiate any proceedings at law or otherwise, or to make any demand upon us. Any holder of a unit may, without the consent of the related unit agent or the holder of any other unit, enforce by appropriate legal action its rights as holder under any security included in the unit.

DESCRIPTION OF WARRANTS

We may issue warrants to purchase common stock, preferred stock or debt securities. We may offer warrants separately or together with one or more additional warrants, common stock, preferred stock or debt securities, or any combination of those securities in the form of units, as described in the applicable prospectus supplement. If we issue warrants as part of a unit, the accompanying prospectus supplement will specify whether those warrants may be separated from the other securities in the unit prior to the expiration date of the warrants. The applicable prospectus supplement will also describe the following terms of any warrants:

- the specific designation and aggregate number of, and the offering price at which we will issue, the warrants;
- the currency or currency units in which the offering price, if any, and the exercise price are payable;
- the date on which the right to exercise the warrants will begin and the date on which that right will expire or, if you may not continuously exercise the warrants throughout that period, the specific date or dates on which you may exercise the warrants;
- whether the warrants are to be sold separately or with other securities as parts of units;
- whether the warrants will be issued in definitive or global form or in any combination of these forms, although, in any case, the form of a warrant included in a unit will correspond to the form of the unit and of any security included in that unit;
- any applicable material U.S. federal income tax consequences;
- the identity of the warrant agent for the warrants and of any other depositaries, execution or paying agents, transfer agents, registrars or other agents;
- the proposed listing, if any, of the warrants or any securities purchasable upon exercise of the warrants on any securities exchange;
- the designation and terms of any equity securities purchasable upon exercise of the warrants;
- the designation, aggregate principal amount, currency and terms of any debt securities that may be purchased upon exercise of the warrants;
- if applicable, the designation and terms of the preferred stock with which the warrants are issued and the number of warrants issued with each security;
- if applicable, the date from and after which any warrants issued as part of a unit and the related debt securities, preferred stock or common stock will be separately transferable;
- the number of shares of common stock or preferred stock purchasable upon exercise of a warrant and the price at which those shares may be purchased;
- if applicable, the minimum or maximum amount of the warrants that may be exercised at any one time;
- information with respect to book-entry procedures, if any;
- the anti-dilution provisions of, and other provisions for changes to or adjustment in the exercise price of, the warrants, if any;
- any redemption or call provisions; and
- any additional terms of the warrants, including terms, procedures and limitations relating to the exchange or exercise of the warrants.

FORMS OF SECURITIES

Each debt security, unit and warrant will be represented either by a certificate issued in definitive form to a particular investor or by one or more global securities representing the entire issuance of securities. Unless the applicable prospectus supplement provides otherwise, certificated securities in definitive form and global securities will be issued in registered form. Definitive securities name you or your nominee as the owner of the security, and in order to transfer or exchange these securities or to receive payments other than interest or other interim payments, you or your nominee must physically deliver the securities to the trustee, registrar, paying agent or other agent, as applicable. Global securities name a depositary or its nominee as the owner of the debt securities, units or warrants represented by these global securities. The depositary maintains a computerized system that will reflect each investor's beneficial ownership of the securities through an account maintained by the investor with its broker/dealer, bank, trust company or other representative, as we explain more fully below.

Global Securities

We may issue the debt securities, units and warrants in the form of one or more fully registered global securities that will be deposited with a depositary or its nominee identified in the applicable prospectus supplement and registered in the name of that depositary or nominee. In those cases, one or more global securities will be issued in a denomination or aggregate denominations equal to the portion of the aggregate principal or face amount of the securities to be represented by global securities. Unless and until it is exchanged in whole for securities in definitive registered form, a global security may not be transferred except as a whole by and among the depositary for the global security, the nominees of the depositary or any successors of the depositary or those nominees.

If not described below, any specific terms of the depositary arrangement with respect to any securities to be represented by a global security will be described in the prospectus supplement relating to those securities. We anticipate that the following provisions will apply to all depositary arrangements.

Ownership of beneficial interests in a global security will be limited to persons, called participants, that have accounts with the depositary or persons that may hold interests through participants. Upon the issuance of a global security, the depositary will credit, on its book-entry registration and transfer system, the participants' accounts with the respective principal or face amounts of the securities beneficially owned by the participants. Any dealers, underwriters or agents participating in the distribution of the securities will designate the accounts to be credited. Ownership of beneficial interests in a global security will be shown on, and the transfer of ownership interests will be effected only through, records maintained by the depositary, with respect to interests of participants, and on the records of participants, with respect to interests of persons holding through participants. The laws of some states may require that some purchasers of securities take physical delivery of these securities in definitive form. These laws may impair your ability to own, transfer or pledge beneficial interests in global securities.

So long as the depositary, or its nominee, is the registered owner of a global security, that depositary or its nominee, as the case may be, will be considered the sole owner or holder of the securities represented by the global security for all purposes under the applicable indenture, unit agreement or warrant agreement. Except as described below, owners of beneficial interests in a global security will not be entitled to have the securities represented by the global security registered in their names, will not receive or be entitled to receive physical delivery of the securities in definitive form and will not be considered the owners or holders of the securities under the applicable indenture, unit agreement or warrant agreement. Accordingly, each person owning a beneficial interest in a global security must rely on the procedures of the depositary for that global security and, if that person is not a participant, on the procedures of the participant through which the person owns its interest, to exercise any rights of a holder under the applicable indenture, unit agreement or warrant agreement. We understand that under existing industry practices, if we request any action of holders or if an owner of a beneficial interest in a global security desires to give or take any action that a holder is entitled to give or take

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under the applicable indenture, unit agreement or warrant agreement, the depository for the global security would authorize the participants holding the relevant beneficial interests to give or take that action, and the participants would authorize beneficial owners owning through them to give or take that action or would otherwise act upon the instructions of beneficial owners holding through them.

Principal, premium, if any, and interest payments on debt securities, and any payments to holders with respect to warrants or units, represented by a global security registered in the name of a depository or its nominee will be made to the depository or its nominee, as the case may be, as the registered owner of the global security. None of us, or any trustee, warrant agent, unit agent or other agent of ours, or any agent of any trustee, warrant agent or unit agent will have any responsibility or liability for any aspect of the records relating to payments made on account of beneficial ownership interests in the global security or for maintaining, supervising or reviewing any records relating to those beneficial ownership interests.

We expect that the depository for any of the securities represented by a global security, upon receipt of any payment to holders of principal, premium, interest or other distribution of underlying securities or other property on that registered global security, will immediately credit participants' accounts in amounts proportionate to their respective beneficial interests in that global security as shown on the records of the depository. We also expect that payments by participants to owners of beneficial interests in a global security held through participants will be governed by standing customer instructions and customary practices, as is now the case with the securities held for the accounts of customers or registered in "street name," and will be the responsibility of those participants.

If the depository for any of the securities represented by a global security is at any time unwilling or unable to continue as depository or ceases to be a clearing agency registered under the Exchange Act, and a successor depository registered as a clearing agency under the Exchange Act is not appointed by us within 90 days, we will issue securities in definitive form in exchange for the global security that had been held by the depository. Any securities issued in definitive form in exchange for a global security will be registered in the name or names that the depository gives to the relevant trustee, warrant agent, unit agent or other relevant agent of ours or theirs. It is expected that the depository's instructions will be based upon directions received by the depository from participants with respect to ownership of beneficial interests in the global security that had been held by the depository.

PLAN OF DISTRIBUTION

We may sell securities:

- through underwriters;
- through dealers;
- through agents;
- directly to purchasers; or
- through a combination of any of these methods of sale.

In addition, we may issue the securities as a dividend or distribution or in a subscription rights offering to our existing security holders. This prospectus may be used in connection with any offering of our securities through any of these methods or other methods described in the applicable prospectus supplement.

We may directly solicit offers to purchase securities, or agents may be designated to solicit such offers. We will, in the prospectus supplement relating to such offering, name any agent that could be viewed as an underwriter under the Securities Act, and describe any commissions that we must pay. Any such agent will be acting on a best efforts basis for the period of its appointment or, if indicated in the applicable prospectus supplement, on a firm commitment basis.

The distribution of the securities may be effected from time to time in one or more transactions:

- at a fixed price, or prices, which may be changed from time to time;
- at market prices prevailing at the time of sale;
- at prices related to such prevailing market prices; or
- at negotiated prices.

Each prospectus supplement will describe the method of distribution of the securities and any applicable restrictions.

The prospectus supplement with respect to the securities of a particular series will describe the terms of the offering of the securities, including the following:

- the name of the agent or any underwriters;
- the public offering or purchase price and the proceeds we will receive from the sale of the securities;
- any discounts and commissions to be allowed or re-allowed or paid to the agent or underwriters;
- all other items constituting underwriting compensation;
- any discounts and commissions to be allowed or re-allowed or paid to dealers; and
- any exchanges on which the securities will be listed.

If any underwriters or agents are utilized in the sale of the securities in respect of which this prospectus is delivered, we will enter into an underwriting agreement or other agreement with them at the time of sale to them, and we will set forth in the prospectus supplement relating to such offering the names of the underwriters or agents and the terms of the related agreement with them.

If a dealer is utilized in the sale of the securities in respect of which this prospectus is delivered, we will sell such securities to the dealer, as principal. The dealer may then resell such securities to the public at varying prices to be determined by such dealer at the time of resale.

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If we offer securities in a subscription rights offering to our existing security holders, we may enter into a standby underwriting agreement with dealers, acting as standby underwriters. We may pay the standby underwriters a commitment fee for the securities they commit to purchase on a standby basis. If we do not enter into a standby underwriting arrangement, we may retain a dealer-manager to manage a subscription rights offering for us.

Remarketing firms, agents, underwriters, dealers and other persons may be entitled under agreements which they may enter into with us to indemnification by us against certain civil liabilities, including liabilities under the Securities Act, and may be customers of, engage in transactions with or perform services for us in the ordinary course of business.

If so indicated in the applicable prospectus supplement, we will authorize underwriters or other persons acting as our agents to solicit offers by certain institutions to purchase securities from us pursuant to delayed delivery contracts providing for payment and delivery on the date stated in the prospectus supplement. Each contract will be for an amount not less than, and the aggregate amount of securities sold pursuant to such contracts shall not be less nor more than, the respective amounts stated in the prospectus supplement. Institutions with whom the contracts, when authorized, may be made include commercial and savings banks, insurance companies, pension funds, investment companies, educational and charitable institutions and other institutions, but shall in all cases be subject to our approval. Delayed delivery contracts will not be subject to any conditions except that:

- the purchase by an institution of the securities covered under that contract shall not at the time of delivery be prohibited under the laws of the jurisdiction to which that institution is subject; and
- if the securities are also being sold to underwriters acting as principals for their own account, the underwriters shall have purchased such securities not sold for delayed delivery. The underwriters and other persons acting as our agents will not have any responsibility in respect of the validity or performance of delayed delivery contracts.

Certain agents, underwriters and dealers, and their associates and affiliates may be customers of, have borrowing relationships with, engage in other transactions with, and/or perform services, including investment banking services, for us or one or more of our respective affiliates in the ordinary course of business.

In order to facilitate the offering of the securities, any underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of the securities or any other securities the prices of which may be used to determine payments on such securities. Specifically, any underwriters may over allot in connection with the offering, creating a short position for their own accounts. In addition, to cover over allotments or to stabilize the price of the securities or of any such other securities, the underwriters may bid for, and purchase, the securities or any such other securities in the open market. Finally, in any offering of the securities through a syndicate of underwriters, the underwriting syndicate may reclaim selling concessions allowed to an underwriter or a dealer for distributing the securities in the offering if the syndicate repurchases previously distributed securities in transactions to cover syndicate short positions, in stabilization transactions or otherwise. Any of these activities may stabilize or maintain the market price of the securities above independent market levels. Any such underwriters are not required to engage in these activities and may end any of these activities at any time.

Under Rule 15c6-1 of the Exchange Act, trades in the secondary market generally are required to settle in two business days, unless the parties to any such trade expressly agree otherwise or the securities are sold by us to an underwriter in a firm commitment underwritten offering. The applicable prospectus supplement may provide that the original issue date for your securities may be more than two scheduled business days after the trade date for your securities. Accordingly, in such a case, if you wish to trade securities on any date prior to the second business day before the original issue date for your securities, you will be required, by virtue of the fact that your securities initially are expected to settle in more than two scheduled business days after the trade date for your securities, to make alternative settlement arrangements to prevent a failed settlement.

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The securities may be new issues of securities and may have no established trading market. The securities may or may not be listed on a national securities exchange. We can make no assurance as to the liquidity of or the existence of trading markets for any of the securities.

In compliance with the guidelines of the Financial Industry Regulatory Authority, or FINRA, the aggregate maximum discount, commission or agency fees or other items constituting underwriting compensation to be received by any FINRA member or independent broker-dealer will not exceed 8% of the proceeds from any offering pursuant to this prospectus and any applicable prospectus supplement.

LEGAL MATTERS

Unless the applicable prospectus supplement indicates otherwise, the validity of the securities in respect of which this prospectus is being delivered will be passed upon by Wilmer Cutler Pickering Hale and Dorr LLP.

EXPERTS

The financial statements of Arsanis, Inc. incorporated in this prospectus by reference to the Annual Report on Form 10-K of Arsanis, Inc. for the year ended December 31, 2017 have been so incorporated in reliance on the report (which contains an explanatory paragraph relating to the Company's requirement for additional financing to fund future operations as described in Note 1 to the consolidated financial statements) of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

The financial statements of X4 Pharmaceuticals, Inc. as of December 31, 2017 and 2016 and for the years then ended included in this prospectus have been so included in reliance on the report (which contains an explanatory paragraph relating to the Company's ability to continue as a going concern as described in Note 1 to the consolidated financial statements) of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.



**5,670,000 Shares of Common Stock
Pre-Funded Warrants to Purchase 2,130,000 Shares of Common Stock
Class A Warrants to Purchase 3,900,000 Shares of Common Stock**

PROSPECTUS SUPPLEMENT

Joint Book-Running Managers

Cowen

Lead Manager

Stifel

Canaccord Genuity

April 12, 2019
