UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2018

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission File Number 001-34620

IRONWOOD PHARMACEUTICALS, INC.

(Exact name of registrant as specified in its charter)

Delaware (State or other jurisdiction of incorporation or organization)	**04-3404176** (I.R.S. Employer Identification Number)
301 Binney Street **Cambridge, Massachusetts** (Address of Principal Executive Offices)	**02142** (Zip Code)

Registrant's telephone number, including area code: **(617) 621-7722**

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Class A common stock, $0.001 par value	The Nasdaq Stock Market LLC (Nasdaq Global Select Market)

Securities registered pursuant to Section 12(g) of the Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Exchange Act. Yes ☐ No ☒

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the Registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit and post such files). Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☒

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐ Emerging growth company ☐

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

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

Aggregate market value of voting stock held by non-affiliates of the Registrant as of June 30, 2018: $2,802,656,540

As of February 12, 2019, there were 154,645,260 shares of Class A common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE:

Portions of the definitive proxy statement for our 2019 Annual Meeting of Stockholders are incorporated by reference into Part III of this report.

NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K, including the sections titled "Business," "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations," contains forward-looking statements. All statements contained in this Annual Report on Form 10-K other than statements of historical fact are forward-looking statements. Forward-looking statements include statements regarding our future financial position, business strategy, budgets, projected costs, plans and objectives of management for future operations. The words "may," "continue," "estimate," "intend," "plan," "will," "believe," "project," "expect," "seek," "anticipate" and similar expressions may identify forward-looking statements, but the absence of these words does not necessarily mean that a statement is not forward-looking. These forward-looking statements include, among other things, statements about:

- the demand and market potential for our products in the countries where they are approved for marketing, as well as the revenues therefrom;
- the timing, investment and associated activities involved in commercializing LINZESS ® by us and Allergan plc in the U.S.;
- the timing and execution of the launches and commercialization of CONSTELLA ® in Europe and LINZESS in Japan;
- the timing, investment and associated activities involved in developing, obtaining regulatory approval for, launching, and commercializing our products and product candidates by us and our partners worldwide;
- our ability and the ability of our partners to secure and maintain adequate reimbursement for our products;
- our ability and the ability of our partners and third parties to manufacture and distribute sufficient amounts of linaclotide active pharmaceutical ingredient, drug product and finished goods, as applicable, on a commercial scale;
- our expectations regarding U.S. and foreign regulatory requirements for our products and our product candidates, including our post-approval development and regulatory requirements;
- the ability of our product candidates to meet existing or future regulatory standards;
- the safety profile and related adverse events of our products and our product candidates;
- the therapeutic benefits and effectiveness of our products and our product candidates and the potential indications and market opportunities therefor;
- our and our partners' ability to obtain and maintain intellectual property protection for our products and our product candidates and the strength thereof, as well as Abbreviated New Drug Applications filed by generic drug manufacturers and potential U.S. Food and Drug Administration approval thereof, and associated patent infringement suits that we have filed or may file, or other action that we may take against such companies, and the timing and resolution thereof;
- our and our partners' ability to perform our respective obligations under our collaboration, license and other agreements, and our ability to achieve milestone and other payments under such agreements;
- our plans with respect to the development, manufacture or sale of our product candidates and the associated timing thereof, including the design and results of pre-clinical and clinical studies;
- the in-licensing or acquisition of externally discovered businesses, products or technologies, as well as partnering arrangements, including expectations relating to the completion of, or the realization of the expected benefits from, such transactions;
- our expectations as to future financial performance, revenues, expense levels, payments, cash flows,

profitability, tax obligations, capital raising and liquidity sources, real estate needs and concentration of voting control, as well as the timing and drivers thereof, and internal control over financial reporting;

- our ability to repay our outstanding indebtedness when due, or redeem or repurchase all or a portion of such debt, as well as the potential benefits of the note hedge transactions described herein;
- inventory levels and write downs, or asset impairments, and the drivers thereof, and inventory purchase commitments;
- our ability to compete with other companies that are or may be developing or selling products that are competitive with our products and product candidates;
- the status of government regulation in the life sciences industry, particularly with respect to healthcare reform;
- trends and challenges in our potential markets;
- our ability to attract and motivate key personnel;
- the planned separation of the Company's operations into two independent, publicly traded companies, including the completion and timing of the separation, the business and operations of each company and any benefits or costs of the separation, including the distribution of shares and tax treatment; and
- other factors discussed elsewhere in this Annual Report on Form 10-K.

Any or all of our forward-looking statements in this Annual Report on Form 10-K may turn out to be inaccurate. These forward-looking statements may be affected by inaccurate assumptions or by known or unknown risks and uncertainties, including the risks, uncertainties and assumptions identified under the heading "Risk Factors" in this Annual Report on Form 10-K. In light of these risks, uncertainties and assumptions, the forward-looking events and circumstances discussed in this Annual Report on Form 10-K may not occur as contemplated, and actual results could differ materially from those anticipated or implied by the forward-looking statements.

You should not unduly rely on these forward-looking statements, which speak only as of the date of this Annual Report on Form 10-K. Unless required by law, we undertake no obligation to publicly update or revise any forward-looking statements to reflect new information or future events or otherwise. You should, however, review the factors and risks we describe in the reports we will file from time to time with the U.S. Securities and Exchange Commission, or the SEC, after the date of this Annual Report on Form 10-K.

NOTE REGARDING TRADEMARKS

LINZESS ® and CONSTELLA ® are trademarks of Ironwood Pharmaceuticals, Inc. ZURAMPIC ® and DUZALLO ® are trademarks of AstraZeneca AB. Any other trademarks referred to in this Annual Report on Form 10-K are the property of their respective owners. All rights reserved.

TABLE OF CONTENTS

PART I

Item 1. *Business*

Our Company

We are a commercial biotechnology company leveraging our proven development and commercial capabilities as we seek to bring multiple medicines to patients. In May 2018, we announced our intent to separate into two independent, publicly traded companies – Ironwood Pharmaceuticals, Inc, or Ironwood. and Cyclerion Therapeutics, Inc., or Cyclerion. Following the completion of the planned separation, Ironwood will be a gastrointestinal, or GI, focused healthcare company leveraging our proven development and commercial capabilities as we seek to bring multiple medicines to patients. We are advancing innovative product opportunities in areas of large unmet need, capitalizing on our expertise in GI diseases. Cyclerion will be a clinical stage biopharmaceutical company harnessing the power of sGC pharmacology to discover, develop and commercialize breakthrough treatments for serious and orphan diseases.

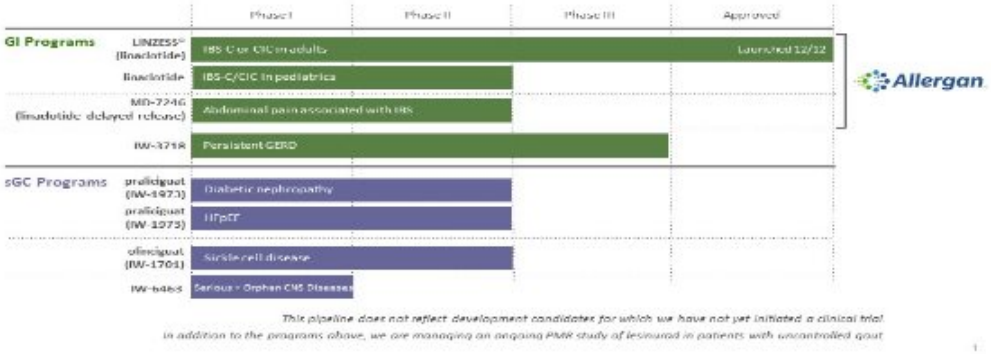
Our commercial product, linaclotide, is available to adult men and women suffering from irritable bowel syndrome with constipation, or IBS-C, or chronic idiopathic constipation, or CIC, in certain countries around the world. Linaclotide is available under the trademarked name LINZESS ® to adult men and women suffering from IBS-C or CIC in the United States, or the U.S., and Mexico, and to adult men and women suffering from IBS-C or chronic constipation in Japan. Linaclotide is available under the trademarked name CONSTELLA ® to adult men and women suffering from IBS-C or CIC in Canada, and to adult men and women suffering from IBS-C in certain European countries.

We and our U.S. linaclotide partner Allergan plc (together with its affiliates), or Allergan, are exploring ways to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions. In July 2018, we announced the initiation of a Phase IIIb trial evaluating the efficacy and safety of linaclotide 290 mcg on multiple abdominal symptoms including pain, bloating and discomfort, in adult patients with IBS-C.

We and Allergan are also seeking to expand the clinical utility of linaclotide by demonstrating the pain-relieving effect of a delayed release formulation through the advancement of MD-7246 (linaclotide delayed release) in IBS with diarrhea, or IBS-D.

We are advancing another GI development program, IW-3718, a gastric retentive formulation of a bile acid sequestrant for the potential treatment of persistent gastroesophageal reflux disease, or persistent GERD. In June 2018, we initiated two Phase III clinical trials evaluating the safety and efficacy of IW-3718 in patients with persistent GERD.

The following table presents the status of selected key development programs in our pipeline:



The status of our development programs in the table above represents the ongoing phase of development and does not correspond to the completion of a particular phase. Drug development involves a high degree of risk and investment, and the status, timing and scope of our development programs are subject to change. Important factors that could adversely affect our drug development efforts are discussed in the "Risk Factors" section of this Annual Report on Form 10-K.

We were incorporated in Delaware on January 5, 1998 as Microbia, Inc. On April 7, 2008, we changed our name to Ironwood Pharmaceuticals, Inc. To date, we have dedicated a majority of our activities to the research, development and commercialization of linaclotide and the commercialization of lesinurad, as part of our uncontrolled gout program, which we are in the process of discontinuing, as well as to the research and development of our other product candidates.

GI Programs

IBS-C / CIC

IBS-C and CIC are chronic, functional GI disorders that afflict millions of sufferers worldwide. As many as 13 million adults suffer from IBS-C and as many as 35 million adults suffer from CIC in the U.S. alone, according to our analysis of studies including P Pare, et al. (published in 2001 in the *American Journal of Gastroenterology*) and J.F. Johanson, et al. (published in 2007 in *Alimentary Pharmacology and Therapeutics*) and American College of Gastroenterology Chronic Constipation Task Force (2005), American Journal of Gastroenterology Vol. 100, No. S1, 2005. Symptoms of IBS-C include abdominal pain, discomfort or bloating and constipation symptoms (e.g., incomplete evacuation, infrequent bowel movements, hard/lumpy stools), while CIC is primarily characterized by constipation symptoms.

Linaclotide—U.S. In August 2012, the FDA approved LINZESS as a once-daily treatment for adult men and women suffering from IBS-C (290mcg dose) or CIC (145mcg dose). We and Allergan began commercializing LINZESS in the U.S. in December 2012. In January 2017, the FDA approved a 72 mcg dose of linaclotide for the treatment of adult men and women with CIC. Linaclotide is the first product approved by the FDA in a class of GI medicines called guanylate cyclase type-C, or GC-C, agonists. We and Allergan continue to explore ways to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions.

Additional Abdominal Symptom Claims. We and Allergan have identified a development path with LINZESS intended to obtain abdominal symptom claims including bloating and discomfort, two highly bothersome symptoms associated with IBS-C, through a single Phase III trial. Greater than 65% of IBS-C patients suffer from bloating and/or discomfort at least one time per week, according to the Lieberman GI Patient Landscape Survey performed in 2010. In July 2018, we and Allergan initiated a Phase IIIb clinical trial evaluating the efficacy and safety of linaclotide 290 mcg on multiple abdominal symptoms in addition to pain, including bloating and discomfort in adult patients with IBS-C.

Pediatrics. We and Allergan have established a nonclinical and clinical post-marketing plan with the FDA to understand the safety and efficacy of LINZESS in pediatric patients. We and Allergan are advancing clinical pediatric programs in IBS-C patients age seven to 17 and functional constipation patients age six to 17.

LINZESS is covered by a U.S. composition of matter patent that expires in 2026, including patent term extension, as well as multiple additional patents covering the commercial formulation of LINZESS and methods of using this formulation to treat patients with IBS C or CIC, the latest of which expire in the early 2030s. We and Allergan have received Paragraph IV certification notice letters, or Notice Letters, regarding Abbreviated New Drug Applications, or ANDAs, submitted to the FDA by generic drug manufacturers requesting approval to engage in commercial manufacture, use, sale and offer for sale of linaclotide capsules (72 mcg, 145 mcg and 290 mcg), proposed generic versions of LINZESS. In 2018, we and Allergan entered into settlement agreements with three generic drug manufacturers. For additional information relating to such ANDAs and any resolution of related litigation, see Item 3, *Legal Proceedings* , elsewhere in this Annual Report on Form 10-K.

Linaclotide—Global. Allergan has rights to develop and commercialize linaclotide in all countries worldwide other than China, Hong Kong, Macau and Japan. In November 2012, the European Commission granted marketing authorization to CONSTELLA for the symptomatic treatment of moderate to severe IBS-C in adults. CONSTELLA is

the first, and to date, only drug approved in the European Union, or E.U., for IBS-C. CONSTELLA first became commercially available in certain European countries beginning in the second quarter of 2013. Allergan is commercializing CONSTELLA in a number of European countries, including the United Kingdom, Italy and Spain.

In December 2013 and February 2014, linaclotide was approved in Canada and Mexico, respectively, as a treatment for adult men and women suffering from IBS-C or CIC. Allergan has exclusive rights to commercialize linaclotide in Canada as CONSTELLA and in Mexico as LINZESS. In May 2014, CONSTELLA became commercially available in Canada and in June 2014, LINZESS became commercially available in Mexico.

Astellas Pharma Inc., or Astellas, has rights to develop and commercialize linaclotide in Japan. In December 2016, the Japanese Ministry of Health, Labor and Welfare approved LINZESS for the treatment of adults with IBS-C in Japan. In March 2017, Astellas began commercializing LINZESS for the treatment of adults with IBS-C in Japan. In August 2018, the Japanese Ministry of Health, Labor and Welfare approved LINZESS for the treatment of adults with chronic constipation in Japan. In September 2018, Astellas began commercializing LINZESS for the treatment of adult patients with chronic constipation in Japan.

We and AstraZeneca are co-developing linaclotide in China, Hong Kong and Macau, with AstraZeneca having primary responsibility for the local operational execution. In January 2019, the National Medical Products Administration approved the marketing application for LINZESS for adults with IBS-C in China.

CONSTELLA is covered by European composition of matter patents, which expire in 2024. LINZESS is covered by Japanese composition of matter patents and commercial formulation patents which expire between 2024 and 2032. In addition, we have Chinese composition of matter patents and commercial formulation patents which expire between 2024 and 2032.

Abdominal Pain associated with IBS

MD-7246. There are an estimated 16 million Americans who suffer from symptoms of IBS-D, according to Grundmann and Yoon in Irritable Bowel Syndrome: epidemiology, diagnosis and treatment: an update for health-care practitioners (published in the Journal of Gastroenterology and Hepatology in 2010) and the United States Census Bureau.

We and Allergan are initially exploring MD-7246 as an oral, intestinal, non-opioid, pain-relieving agent for patients suffering from IBS with diarrhea.

Persistent GERD

IW-3718. There are an estimated 10 million Americans who suffer regularly from symptoms of GERD, such as heartburn and regurgitation, despite receiving treatment with the current standard of care, a proton pump inhibitor, to suppress stomach acid, according to a study published in 2010 by H. El-Sarag in *Alimentary Pharmacology & Therapeutics* and 2015 U.S. census data. Research suggests some persistent GERD patients may experience reflux of bile from the intestine into the stomach and esophagus.

We are advancing IW-3718, a gastric retentive formulation of a bile acid sequestrant, for the potential treatment of persistent GERD. Our clinical research has demonstrated that reflux of bile from the intestine into the stomach and esophagus plays a key role in the ongoing symptoms of persistent GERD. IW-3718 is a novel formulation of a bile acid sequestrant designed to release in the stomach over an extended period of time, bind to bile that refluxes into the stomach, and potentially provide symptomatic relief in patients with persistent GERD. In June 2018, we initiated two Phase III clinical trials evaluating the safety and efficacy of IW-3718 in patients with persistent GERD.

Uncontrolled Gout Programs

In June 2016, we closed a transaction with AstraZeneca, or the Lesinurad Transaction, pursuant to which we received an exclusive license to develop, manufacture, and commercialize in the U.S. products containing lesinurad as an active ingredient, or the Lesinurad License, including ZURAMPIC ® and DUZALLO ® In January 2018, we commenced an initiative to evaluate the optimal mix of investments for our lesinurad franchise for uncontrolled gout, including DUZALLO and ZURAMPIC. As part of this effort, in 2018 we began re-allocating resources within our lesinurad franchise to systematically explore a more comprehensive marketing mix in select test markets (with paired controls), while continuing to build market presence for the lesinurad franchise across the country. In July 2018, we obtained and analyzed the results from the lesinurad franchise test markets. Data from the test markets did not meet expectations. In connection with the results, our Board of Directors determined on July 31, 2018 to terminate the lesinurad license agreement.

Cyclerion Therapeutics, Inc.

Cyclerion, the company that is expected to spin out of Ironwood following the completion of the planned separation, is expected to be a clinical stage biopharmaceutical company intended to harness the power of sGC pharmacology to discover, develop and commercialize breakthrough treatments for serious and orphan diseases. The company plans to focus on enabling the full therapeutic potential of next generation sGC stimulators. sGC stimulators are small molecules that act synergistically with nitric oxide on sGC to boost production of cyclic guanosine monophosphate, or cGMP. cGMP is a key second messenger that, when produced by sGC, regulates diverse and critical biological functions throughout the body including blood flow and vascular dynamics, inflammatory and fibrotic processes, metabolism and neuronal function. Cyclerion believes that the key to unlocking the full therapeutic potential of the nitric oxide cGMP pathway is to design differentiated next generation sGC stimulators that preferentially modulate pathway signaling in tissues of greatest relevance to the diseases they are developed to treat. This targeted approach is intended to maximize the potential benefits of nitric oxide cGMP pathway stimulation in disease relevant tissues.

Cyclerion's portfolio is currently comprised of five sGC stimulators:

- olinciguat, currently in a Phase 2 trial as an oral, once-daily vascular sGC stimulator for patients suffering from sickle cell disease;
- praliciguat, in two distinct Phase 2 trials as an oral, once daily systemic sGC stimulator for heart failure with preserved ejection fraction, or HFpEF, and for diabetic nephropathy, respectively;
- IW 6463, a central nervous system penetrant oral sGC stimulator in clinical development for serious neurodegenerative diseases; and
- two organ targeted programs to address serious diseases of the liver and lung, respectively.

Collaborations and Partnerships

As part of our strategy, we have established development and commercial capabilities that we plan to leverage as we seek to bring multiple medicines to patients. We intend to play an active role in the development and commercialization of our products in the U.S., either independently or with partners that have strong capabilities. We also intend to establish strong global brands by out-licensing development and commercialization rights to our products in other key territories to high-performing partners. We believe in the long-term value of our drug candidates, so we seek collaborations that increase the value of our programs by providing meaningful economics and incentives for us and any potential partner. Furthermore, we seek partners who share our values, culture, processes and vision for our products, which we believe will enable us to work with those partners successfully for the entire potential patent life of our drugs. We intend to continue to expand our expertise in GI by accessing innovative externally developed products through strategic transactions and to leverage our existing capabilities to develop and commercialize these products in the U.S.

The following chart shows our revenue for the U.S. and territories outside of the U.S. as a percentage of our total revenue for each of the years ended December 31, 2018, 2017, and 2016.

	Year Ended December 31,		
	2018	2017	2016
U.S.	79.0 %	89.0 %	83.1 %
Japan	20.1 %	10.0 %	16.2 %
Rest of world	0.9 %	1.0 %	0.7 %
	100.0 %	100.0 %	100.0 %

Revenue attributable to our linaclotide partnerships comprised substantially all of our revenue for each of the years indicated. Further, we currently derive a significant portion of our revenue from our LINZESS collaboration with Allergan for the U.S. and believe that the revenues from this collaboration will continue to constitute a significant portion of our total revenue for the foreseeable future. In addition, our collaborative arrangements revenue and sale of API outside of the U.S. has fluctuated for the years ended December 31, 2018, 2017, and 2016, and may continue to fluctuate as a result of the timing and amount of sales of linaclotide API to certain of our partners, license fees and clinical and commercial milestones received and recognized under our current and future strategic partnerships outside of the U.S., as well as the timing and amount of royalties from the sales of linaclotide in the markets in which it is currently approved, or any other markets where linaclotide receives approval.

Linaclotide

We have pursued a partnering strategy for commercializing linaclotide that has enabled us to retain significant oversight over linaclotide's development and commercialization worldwide, share the costs with collaborators whose capabilities complement ours, and retain a significant portion of linaclotide's future long-term value. As of December 31, 2018, licensing fees, milestones, royalties and related equity investments from our linaclotide partners cumulatively totaled approximately $415.6 million. In addition, we and Allergan jointly fund the development and commercialization of LINZESS in the U.S., sharing equally in any net profits or losses, and we and AstraZeneca jointly fund the development and commercialization of linaclotide in China, Hong Kong and Macau, with AstraZeneca receiving 55% of the net profits or incurring 55% of the net losses until a certain specified commercial milestone is achieved, at which time profits or losses will be shared equally thereafter. Such reimbursements for our development and commercialization costs received from Allergan in the U.S. or AstraZeneca in China, Hong Kong, and Macau are excluded from the amount above.

Collaboration Agreement for North America with Allergan

In September 2007, we entered into a collaboration agreement with Allergan to develop and commercialize linaclotide for the treatment of IBS-C, CIC and other GI conditions in North America. Under the terms of the collaboration agreement, we and Allergan are jointly and equally funding the development and commercialization of LINZESS in the U.S., with equal share of any profits or losses. Additionally, we granted Allergan exclusive rights to develop and commercialize linaclotide in Canada and Mexico for which we receive royalties in the mid-teens percent on net sales in those countries. Allergan is solely responsible for the further development, regulatory approval and commercialization of linaclotide in those countries and funding any costs. Total licensing, milestone payments, and related equity investments under the Allergan collaboration agreement for North America could total up to $330.0 million, including the $205.0 million that Allergan has already paid to us in license fees and all six development-related milestones and the $25.0 million of our capital stock that Allergan has already purchased.

License Agreement with Allergan (All countries other than the countries and territories of North America, China, Hong Kong, Macau, and Japan)

In April 2009, we entered into a license agreement with Almirall, or the European License Agreement, to develop and commercialize linaclotide in Europe (including the Commonwealth of Independent States and Turkey) for the treatment of IBS-C, CIC and other GI conditions. In October 2015, Almirall transferred its exclusive license to develop and commercialize linaclotide in Europe to Allergan. Additionally, in October 2015, we and Allergan separately entered into an amendment to the European License Agreement relating to the development and commercialization of linaclotide in Europe. Pursuant to the terms of the amendment, (i) certain sales-based milestones payable to us under the

European License Agreement were such that, when aggregated with the remaining commercial launch milestones, they could total up to $42.5 million, (ii) the royalties payable to us during the term of the European License Agreement were modified such that the royalties based on sales volume in Europe begin in the mid-single digit percent and escalate to the upper-teens percent by calendar year 2019, and (iii) Allergan assumed responsibility for the manufacturing of linaclotide API for Europe from us, as well as the associated costs.

In January 2017, we and Allergan entered into an amendment to the European License Agreement. The European License Agreement, as amended, extended the license to develop and commercialize linaclotide in all countries other than China, Hong Kong, Macau, Japan, and the countries and territories of North America. On a country-by-country and product-by-product basis in such additional territory, Allergan is obligated to pay us a royalty as a percentage of net sales of products containing linaclotide as an active ingredient in the upper-single digits for five years following the first commercial sale of a linaclotide product in a country, and in the low-double digits thereafter. The royalty rate for products in the expanded territory will decrease, on a country-by-country basis, to the lower-single digits, or cease entirely, following the occurrence of certain events. Allergan is also obligated to assume certain purchase commitments for quantities of linaclotide API under our agreements with third-party API suppliers. The amendment to the European License Agreement did not modify any of the milestones or royalty terms related to Europe.

License Agreement for Japan with Astellas

In November 2009, we entered into a license agreement with Astellas, as amended, to develop and commercialize linaclotide for the treatment of IBS-C, CIC and other GI conditions in Japan. Astellas is responsible for development, regulatory approval and commercialization in Japan, as well as funding the associated costs. Astellas has paid us all licensing and milestone payments under the license agreement totaling $75.0 million. These payments consisted of a $30.0 million up-front licensing fee and $45.0 million in development milestones. Astellas is obligated to pay us gross royalties which escalate based on sales volume in the Astellas territory, beginning in the low-twenties percent, less the transfer price paid by Astellas to us for the API included in the product actually sold in Japan and other contractual deductions.

Collaboration Agreement for China, Hong Kong and Macau with AstraZeneca

In October 2012, we entered into a collaboration agreement with AstraZeneca to co-develop and co-commercialize linaclotide in China, Hong Kong and Macau. In January 2019, the National Medical Products Administration approved the marketing application for LINZESS for adults with IBS-C in China. Under the terms of the agreement, we and AstraZeneca are jointly funding the development and commercialization of linaclotide in the AstraZeneca territory, with AstraZeneca receiving 55% of the net profits or incurring 55% of the net losses until a certain specified commercial milestone is achieved, at which time profits or losses will be shared equally thereafter. If linaclotide is successfully developed and commercialized in the AstraZeneca territory, total licensing and milestone payments to us under the collaboration agreement could total up to $150.0 million, including the $25.0 million that AstraZeneca has already paid to us.

Co-Promotion and Other Commercial Agreements

Commercial Agreement with Allergan

In January 2017, we and Allergan entered into a commercial agreement under which the adjustments to our or Allergan's share of the net profits under the share adjustment provision of the collaboration agreement for linaclotide in North America relating to the contractually required calls on physicians in each year are eliminated, in full, in 2018 and all subsequent years. Pursuant to the commercial agreement, Allergan also appointed us, on a non-exclusive basis, to promote CANASA ®, approved for the treatment of ulcerative proctitis, and DELZICOL ®, approved for the treatment of ulcerative colitis, in the U.S. for approximately two years. The share adjustment relief will, in the case of Allergan's termination for convenience and certain other specified circumstances, survive termination of the commercial agreement.

In August 2015, we and Allergan entered into a non-exclusive agreement for the co-promotion of VIBERZI ® (eluxadoline) in the U.S., Allergan's treatment for adults suffering from IBS-D or the VIBERZI Co-Promotion Agreement, which expired in December 2017. Under the terms of the VIBERZI Co-Promotion Agreement, our clinical sales specialists detailed VIBERZI to the same health care practitioners to whom they detailed LINZESS. Allergan was responsible for all costs and activities relating to the commercialization of VIBERZI outside of the co-promotion.

In December 2017, we entered into an agreement with Allergan to continue to promote VIBERZI through December 31, 2018 and to discontinue promoting DELZICOL effective January 1, 2018. We perform certain third position details and offer samples of CANASA to gastroenterology prescribers who are on the then-current call panel for LINZESS to which we provide first or second position details, and we purchase samples of CANASA from Allergan at the actual manufacturing cost. Allergan is obligated to pay us a royalty in the mid-teens on incremental sales of CANASA above a mutually agreed upon sales baseline. We commenced the promotion activities for CANASA on February 27, 2017. In addition, our clinical sales specialists detail VIBERZI to the same health care practitioners to whom they detail LINZESS. We have the potential to achieve milestone payments of up to $7.5 million based on the net sales of VIBERZI, provided we perform a minimum number of VIBERZI calls on physicians, and will also be compensated via reimbursements for medical education initiatives. In December 2018, we entered into an agreement with Allergan to discontinue our promotion of CANASA effective December 31, 2018, and to extend our promotion of VIBERZI through March 31, 2019, subject to our or Allergan's rights of early termination.

Our Strategy

Our mission, following the planned separation, is to create a leading U.S. GI-focused healthcare company. To achieve this mission we intend to capitalize on our expertise in developing and commercializing GI therapies to bring innovative treatment options to patients. Key elements of our strategy include:

- assembling a team with a singular passion and documented success in creating, developing and commercializing GI medicines that can make a significant difference in patients' lives;
- successfully and profitably commercializing LINZESS in collaboration with Allergan in the U.S.;
- exploring development opportunities to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions;
- investing in our pipeline of novel product candidates IW-3718 and MD-7246;
- maximizing the commercial potential of our drugs and playing an active role in their development and commercialization in the U.S. and collaborating with out-licensing partners who share our vision, values, culture, and processes;
- supporting global partners to develop and commercialize linaclotide outside of the U.S.;
- leveraging our U.S.-focused commercial capabilities in marketing, reimbursement, patient engagement and sales;
- evaluating external candidates for in-licensing or acquisition opportunities to strengthen our position as a leading U.S. GI company; and
- executing our strategy with our stockholders' long-term interests in mind by seeking to maximize long-term per share cash flows.

Competition

Linaclotide

Linaclotide competes globally with certain prescription therapies and over-the-counter, or OTC, products for the treatment of IBS-C and CIC, or their associated symptoms.

OTC and generic laxatives make up the majority of the IBS-C and CIC treatment market, according to the Lieberman GI Patient Landscape Survey performed in 2010 and the 2018 U.S. Census. Polyethylene glycol (such as MiraLAX ®) and lactulose account for the majority of prescription laxative treatments, according to 2015 data from IQVIA Inc. National Prescription Audit. Given the low barriers to access, many IBS-C and CIC sufferers try OTC fiber and laxatives, but according to this same patient landscape survey, less than half of them are very satisfied with the

ability of these OTC products to manage their symptoms. Two of the highest selling OTC laxatives in the U.S., based on 2017 U.S. sales volume data from IQVIA Inc. National Prescription Audit, are MiraLAX (PEG 3350) and Dulcolax ®. In November 2018, the FDA withdrew approval for certain prescription products containing MiraLAX for occasional constipation. This change had no effect on OTC products containing MiraLAX for occasional constipation.

Until the launch of LINZESS, the only available branded prescription therapy for IBS-C and CIC in the U.S. was AMITIZA ® (lubiprostone), which was approved for the treatment of CIC in 2006, for the treatment of IBS-C in 2008, and for the treatment of opioid-induced constipation in 2013. AMITIZA is being commercialized in the U.S. by Takeda Pharmaceuticals Limited. Synergy Pharmaceuticals, Inc., or Synergy, obtained approval of TRULANCE ® (plecanatide) in the U.S. for the treatment of CIC in adults in January 2017 and for the treatment of IBS-C in adults in January 2018. In December 2018, Bausch Health Companies agreed to acquire substantially all of Synergy's assets, including all rights to TRULACE, dolcanatide and all related intellectual property in the context of a Chapter 11 bankruptcy process. The sale is subject to a competitive process and the Company's receipt of higher and better offers. Shire plc obtained approval of Motegrity™ (prucalopride) in the U.S. for the treatment of CIC in adults in December 2018. AMITIZA is being commercialized for the treatment of adults with CIC in certain European countries, including the United Kingdom and Switzerland by Sucampo AG, and for the treatment of chronic constipation in Japan by Mylan N.V.

Manufacturing and Supply

We currently manage our global supply and distribution of linaclotide through a combination of contract manufacturers and collaboration partners. It is our objective to produce safe and effective medicine on a worldwide basis, with redundancy built into critical steps of the supply chain. We believe that we have sufficient in-house expertise to manage our manufacturing and supply chain network to meet worldwide demand.

Linaclotide production consists of three phases—manufacture of the API (sometimes referred to as drug substance), manufacture of drug product and manufacture of finished goods. We and certain of our partners have entered into commercial supply agreements with multiple third-party manufacturers for the production of linaclotide API. We believe our commercial suppliers have the capabilities to produce linaclotide API in accordance with current good manufacturing practices, or GMP, on a sufficient scale to meet our development and commercial needs. Our commercial suppliers are subject to routine inspections by regulatory agencies worldwide and also undergo periodic audit and certification by our quality department.

Each of Allergan and Astellas is responsible for drug product and finished goods manufacturing for its respective territories, and distribution of finished goods to their customers. We have an agreement with an independent third party to serve as a source of drug product manufacturing of linaclotide for our partnered territories and we have worked with our partners to achieve sufficient redundancy in this component of the linaclotide supply chain. Under our collaboration with AstraZeneca, we are accountable for drug product and finished goods manufacturing for China, for drug product manufacturing for Hong Kong and Macau, with AstraZeneca accountable for finished goods manufacturing for Hong Kong and Macau.

Prior to linaclotide, there was no precedent for long-term room temperature shelf storage formulation for an orally dosed peptide to be produced in millions of capsules per year. Our efforts to date have led to a formulation that is both cost effective and able to meet the stability requirements for commercial pharmaceutical products. Our work in this area has created an opportunity to seek additional intellectual property protection around the linaclotide program. In conjunction with Allergan and Astellas, we have filed patent applications in the U.S. and foreign jurisdictions and have been issued multiple U.S. patents to protect the current commercial formulation of linaclotide as well as related formulations. These issued U.S. patents expire in the early 2030s. If issued, the pending patent applications would expire in 2029 or later in the U.S. and foreign jurisdictions and would be eligible for potential patent term adjustments or patent term extensions in countries where such extensions may be available.

Sales and Marketing

For the foreseeable future, we intend to develop and commercialize our drugs in the U.S. alone or with partners, and expect to rely on partners to commercialize our drugs in territories outside the U.S. In executing our strategy, our goal is to retain oversight over the worldwide development and commercialization of our products by playing an active role in their commercialization or finding partners who share our vision, values, culture and processes.

We built our commercial capabilities, including marketing, reimbursement, patient engagement and sales, with the intent to leverage these capabilities for future internally and externally developed products. To date, we have established a high-quality commercial organization dedicated to bringing innovative, highly-valued healthcare solutions to our customers, including patients, payers, and healthcare providers.

We are also coordinating efforts with our linaclotide partners to ensure that we launch and maintain an integrated, global linaclotide brand. By leveraging the knowledge base and expertise of our experienced commercial team and the insights of each of our linaclotide commercialization partners, we continually improve our collective marketing strategies.

Patents and Proprietary Rights

We actively seek to protect the proprietary technology that we consider important to our business, including pursuing patents that cover our products and compositions, their methods of use and the processes for their manufacture, as well as any other relevant inventions and improvements that are commercially important to the development of our business. We also rely on trade secrets that may be important to the development of our business.

Our success will depend significantly on our ability to obtain and maintain patent and other proprietary protection for the technology, inventions and improvements we consider important to our business; defend our patents; preserve the confidentiality of our trade secrets; and operate without infringing the patents and proprietary rights of third parties.

Linaclotide Patent Portfolio

Our linaclotide patent portfolio is currently composed of ten U.S. patents listed in the FDA publication, "Approved Drug Products with Therapeutic Equivalence Evaluations", or the Orange Book, three granted European patents, all of which have been validated in each of 31 European countries, nine granted Japanese patents, five granted Chinese patents, 38 issued patents in other foreign jurisdictions, and numerous pending U.S., foreign and Patent Cooperation Treaty, or PCT, patent applications. We own or jointly own all of the issued patents and pending applications.

The issued U.S. patents, which will expire between 2024 and 2033, contain claims directed to the linaclotide molecule, pharmaceutical compositions thereof, methods of using linaclotide to treat GI disorders, processes for making the molecule, and room temperature stable formulations of linaclotide and methods of use thereof. The granted European patents, which will expire between 2024 and 2027, some of which are subject to potential patent term extension, contain claims directed to the linaclotide molecule, pharmaceutical compositions thereof, and uses of linaclotide to prepare medicaments for treating GI disorders. The granted Chinese patents, which will expire between 2024 and 2032, the granted Japanese patents, which will expire between 2024 and 2035, some of which are subject to potential patent term extension, and the granted patents in other foreign jurisdictions, which will expire between 2024 and 2032, some of which may be subject to potential patent term extension, contain claims directed to the linaclotide molecule, pharmaceutical compositions of linaclotide for use in treating GI disorders, and room temperature stable formulations of linaclotide.

We have pending patent applications in certain countries worldwide that, if issued, will expire between 2024 and 2032 and which include claims covering the linaclotide molecule, methods of using linaclotide to treat GI disorders, the current commercial formulation of linaclotide and uses thereof to treat GI disorders.

We have pending applications directed to linaclotide products, including MD-7246, that, if issued, will expire in 2037 or later. We also have pending U.S., foreign and PCT applications directed to linaclotide and related molecules, pharmaceutical formulations thereof, methods of using linaclotide to treat various diseases and disorders and processes for making the molecule. These additional patent applications, if issued, will expire between 2024 and 2037.

The patent term of a patent that covers an FDA-approved drug is also eligible for patent term extension, which permits patent term restoration as compensation for some of the patent term lost during the FDA regulatory review process. The Hatch-Waxman Act permits a patent term extension of a single patent applicable to an approved drug for up to five years beyond the expiration of the patent but the extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval by the FDA. The United States Patent and Trademark

Office, or USPTO, has issued a Certificate of Patent Term Extension for U.S. Patent 7,304,036, which covers linaclotide and methods of use thereof. As a result, the patent term of this patent was extended to August 30, 2026, 14 years from the date of linaclotide's approval by the FDA. Similar provisions are available in Europe and certain other foreign jurisdictions to extend the term of a patent that covers an approved drug. We have received patent term extensions in Japan for several of our linaclotide patents. We have also received patent term extensions, called supplementary protection certificates, for certain linaclotide patents from several national patent offices in Europe.

We and Allergan have received Notice Letters regarding ANDAs submitted to the FDA by generic drug manufacturers requesting approval to engage in commercial manufacture, use, sale and offer for sale of linaclotide capsule (72 mcg, 145 mcg and 290 mcg), proposed generic versions of LINZESS. In 2018, we and Allergan entered into settlement agreements with three generic drug manufacturers. For additional information relating to such ANDAs and any resolution of related litigation, see Item 3. *Legal Proceedings* , elsewhere in this Annual Report on Form 10-K.

IW-3718

Our pipeline patent portfolio relating to our IW-3718 development program is currently composed of one issued U.S. patent and eight issued patents in foreign jurisdictions; and numerous pending provisional, U.S. non-provisional, foreign and PCT patent applications. We own all of the issued patents and pending applications. The issued U.S. patent expires in 2031. The foreign issued patents expire in 2027. The pending patent applications, if issued, will expire between 2027 and 2038.

Additional Intellectual Property

In addition to the patents and patent applications related to linaclotide, and IW-3718, we currently have 11 issued U.S. patents; 27 patents granted in foreign jurisdictions, including European and Eurasian patents that have each been validated in several countries; and a number of pending U.S. foreign and PCT applications directed to other GC-C agonist and sGC stimulator molecules and uses thereof. We also have other issued patents and pending patent applications relating to our other research and development programs.

The term of individual patents depends upon the legal term of the patents in the countries in which they are obtained. In most countries in which we file, the patent term is 20 years from the date of filing the non-provisional application. In the U.S., a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the U.S. Patent and Trademark Office in granting a patent, or may be shortened if a patent is terminally disclaimed over an earlier-filed patent. We also expect to apply for patent term extensions for some of our patents once issued, depending upon the length of clinical trials and other factors involved in the submission of a New Drug Application, or NDA.

Cyclerion Intellectual Property

There are eight issued U.S. patents, 21 pending U.S. patents applications, 10 pending PCT applications, and numerous foreign patents and pending patent applications covering the product candidates that Cyclerion expects to advance following completion of the planned separation of Ironwood and Cyclerion. The olinciguat patent portfolio in the U.S. includes three U.S. patents, four pending U.S. patent applications, three PCT applications and one provisional application. The praliciguat patent portfolio in the U.S. includes three U.S. patents, six pending U.S. patent applications, three PCT applications and one provisional application. The IW-6463 portfolio includes pending PCT, U.S. and foreign applications. The technology underlying the sGC patents and pending patent applications has been developed by us and was not acquired from any in-licensing agreement. We own all of the issued patents and pending applications.

Government Regulation

Our business is subject to government regulation in both the U.S. and in other countries. In the U.S., pharmaceutical products are subject to extensive regulation by the FDA. The Federal Food, Drug, and Cosmetic Act and other federal and state statutes and regulations, as well as similar foreign regulations, govern, among other things, the research, development, testing, manufacture, storage, recordkeeping, approval, labeling, promotion and marketing, distribution, post-marketing requirements and assessments, post-approval monitoring and reporting, sampling, and import and export of pharmaceutical products. The FDA and other regulatory authorities have very broad enforcement authority and failure to abide by applicable regulatory requirements can result in administrative or judicial sanctions

being imposed on us, including warning letters, refusals of government contracts, clinical holds, civil penalties, injunctions, restitution, disgorgement of profits, recall or seizure of products, total or partial suspension of production or distribution, withdrawal of approval, refusal to approve pending applications, and civil or criminal prosecution.

FDA Approval Process

We believe that our product candidates will be regulated by the FDA as drugs. No company may market a new drug until it has submitted an NDA to the FDA, and the FDA has approved it. The steps required before the FDA may approve an NDA generally include:

- conducting nonclinical laboratory tests and animal tests in compliance with FDA's good laboratory practice, or GLP, requirements;
- development, manufacture and testing of active pharmaceutical product and dosage forms suitable for human use in compliance with current GMP;
- conducting adequate and well-controlled human clinical trials that establish the safety and efficacy of the product for its specific intended use(s);
- in order to evaluate a drug in humans in the U.S., an investigational new drug application, or IND, must be submitted and come into effect before human clinical trials may begin;
- the submission to the FDA of an NDA;
- satisfactory completion of one or more FDA inspections of the manufacturing facility or facilities at which the product, or components thereof, are produced to assess compliance with current GMP requirements and to assure that the facilities, methods and controls are adequate to preserve the product's identity, strength, quality and purity;
- inspections of other sources of data in the NDA, such as inspection of clinical trial sites to assess compliance with good clinical practice, or GCP, requirements are also generally required; and
- FDA review and approval of the NDA.

Nonclinical tests include laboratory evaluation of the product candidate, as well as animal studies to assess the potential safety and efficacy of the product candidate. The conduct of the nonclinical tests must comply with federal regulations and requirements including GLP. We must submit the results of the nonclinical tests, together with manufacturing information, analytical data and a proposed clinical trial protocol to the FDA as part of an Investigational New Drug Application, or IND, which must become effective before we may commence human clinical trials in the U.S. The IND will automatically become effective 30 days after its receipt by the FDA, unless the FDA raises concerns or questions before that time about the conduct of the proposed trial. In such a case, we must work with the FDA to resolve any outstanding concerns before the clinical trial can proceed. We cannot be sure that submission of an IND will result in the FDA allowing clinical trials to begin, or that, once begun, issues will not arise that will cause us or the FDA to modify, suspend or terminate such trials. The study protocol and informed consent information for patients in clinical trials must also be submitted to an institutional review board, or IRB, for approval. An IRB may also require the clinical trial at the site to be halted, either temporarily or permanently, for failure to comply with the IRB requirements or if the trial has been associated with unexpected serious harm to subjects. An IRB may also impose other conditions on the trial. For studies conducted outside of the U.S., similarly, we are subject to local regulations which may differ from the U.S. and local regulations must be followed appropriately.

Clinical trials involve the administration of the product candidate to humans under the supervision of qualified investigators, generally physicians not employed by or under the trial sponsor's control. Clinical trials are typically conducted in three sequential phases, though the phases may overlap or be combined. In Phase I, the initial introduction of the drug into healthy human subjects, the drug is usually tested for safety (adverse effects), dosage tolerance and

pharmacologic action, as well as to understand how the drug is taken up by and distributed within the body. Phase II usually involves studies in a limited patient population (individuals with the disease under study) to:

- evaluate preliminarily the efficacy of the drug for specific, targeted conditions;
- determine dosage tolerance and appropriate dosage as well as other important information about how to design larger Phase III trials; and
- identify possible adverse effects and safety risks.

Phase III trials generally further evaluate clinical efficacy and test for safety within an expanded patient population. The conduct of clinical trials is subject to extensive regulation, including compliance with GCP regulations and guidance, and regulations designed to protect the rights and safety of subjects involved in investigations.

The FDA may order the temporary or permanent discontinuation of a clinical trial at any time or impose other sanctions if it believes that the clinical trial is not being conducted in accordance with FDA requirements or presents an unacceptable risk to the clinical trial patients. We may also suspend clinical trials at any time on various grounds.

The results of the nonclinical and clinical studies, together with other detailed information, including the manufacture and composition of the product candidate, are submitted to the FDA in the form of an NDA requesting approval to market the drug. The FDA approval of the NDA is required before marketing of the product may begin in the U.S. If the NDA contains all pertinent information and data, the FDA will "file" the application and begin review. The review process, however, may be extended by FDA requests for additional information, nonclinical or clinical studies, clarification regarding information already provided in the submission, or submission of a risk evaluation and mitigation strategy. The FDA may refer an application to an advisory committee for review, evaluation and recommendation as to whether the application should be approved. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. Before approving an NDA, the FDA will typically inspect the facilities at which the product candidate is manufactured and will not approve the product candidate unless current GMP compliance is satisfactory. The FDA also typically inspects facilities responsible for performing animal testing, as well as clinical investigators who participate in clinical trials. The FDA may refuse to approve an NDA if applicable regulatory criteria are not satisfied, or may require additional testing or information. The FDA may also limit the indications for use and/or require post-marketing testing and surveillance to monitor the safety or efficacy of a product. Once granted, product approvals may be withdrawn if compliance with regulatory standards is not maintained or problems are identified following initial marketing.

The testing and approval process requires substantial time, effort and financial resources, and our product candidates may not be approved on a timely basis, if at all. The time and expense required to perform the clinical testing necessary to obtain FDA approval for regulated products can frequently exceed the time and expense of the research and development initially required to create the product. The results of nonclinical studies and initial clinical trials of our product candidates are not necessarily predictive of the results from large-scale clinical trials, and clinical trials may be subject to additional costs, delays or modifications due to a number of factors, including difficulty in obtaining enough patients, investigators or product candidate supply. Failure by us or our collaborators, licensors or licensees, including Allergan, Astellas and AstraZeneca, to obtain, or any delay in obtaining, regulatory approvals or in complying with requirements could adversely affect commercialization and our ability to receive product or royalty revenues.

Hatch-Waxman Act

The Hatch-Waxman Act established abbreviated approval procedures for generic drugs. Approval to market and distribute these drugs is obtained by submitting an ANDA with the FDA. The application for a generic drug is "abbreviated" because it need not include nonclinical or clinical data to demonstrate safety and effectiveness and may instead rely on the FDA's previous finding that the brand drug, or reference drug, is safe and effective. In order to obtain approval of an ANDA, an applicant must, among other things, establish that its product is bioequivalent to an existing approved drug and that it has the same active ingredient(s), strength, dosage form, and the same route of administration. A generic drug is considered bioequivalent to its reference drug if testing demonstrates that the rate and extent of absorption of the generic drug is not significantly different from the rate and extent of absorption of the reference drug when administered under similar experimental conditions.

The Hatch-Waxman Act also provides incentives by awarding, in certain circumstances, certain legal protections from generic competition. This protection comes in the form of a non-patent exclusivity period, during which the FDA may not accept, or approve, an application for a generic drug, whether the application for such drug is submitted through an ANDA or a through another form of application, known as a 505(b)(2) application.

The Hatch-Waxman Act grants five years of exclusivity when a company develops and gains NDA approval of a new chemical entity that has not been previously approved by the FDA. This exclusivity provides that the FDA may not accept an ANDA or 505(b)(2) application for five years after the date of approval of previously approved drug, or four years in the case of an ANDA or 505(b)(2) application that challenges a patent claiming the reference drug (see discussion below regarding Paragraph IV Certifications). The Hatch‑Waxman Act also provides three years of exclusivity for approved applications for drugs that are not new chemical entities, if the application contains the results of new clinical investigations (other than bioavailability studies) that were essential to approval of the application. Examples of such applications include applications for new indications, dosage forms (including new drug delivery systems), strengths, or conditions of use for an already approved product. This three‑year exclusivity period only protects against FDA approval of ANDAs and 505(b)(2) applications for generic drugs that include the innovation that required new clinical investigations that were essential to approval; it does not prohibit the FDA from accepting or approving ANDAs or 505(b)(2) NDAs for generic drugs that do not include such an innovation.

Paragraph IV Certifications. Under the Hatch‑Waxman Act, NDA applicants and NDA holders must provide information about certain patents claiming their drugs for listing in the Orange Book. When an ANDA or 505(b)(2) application is submitted, it must contain one of several possible certifications regarding each of the patents listed in the Orange Book for the reference drug. A certification that a listed patent is invalid, unenforceable or will not be infringed by the sale of the proposed product is called a "Paragraph IV" certification.

Within 20 days of the acceptance by the FDA of an ANDA or 505(b)(2) application containing a Paragraph IV certification, the applicant must notify the NDA holder and patent owner that the application has been submitted, and provide the factual and legal basis for the applicant's opinion that the patent is invalid or not infringed. The NDA holder or patent holder may then initiate a patent infringement suit in response to the Paragraph IV notice. If this is done within 45 days of receiving notice of the Paragraph IV certification, a 30‑month stay of the FDA's ability to approve the ANDA or 505(b)(2) application is triggered. The FDA may approve the proposed product before the expiration of the 30‑month stay only if a court finds the patent invalid or not infringed, and the court may shorten or lengthen the 30-month stay under certain limited circumstances.

Patent Term Restoration. Under the Hatch‑Waxman Act, a portion of the patent term lost during product development and FDA review of an NDA or 505(b)(2) application is restored if approval of the application is the first permitted commercial marketing of a drug containing the active ingredient. The patent term restoration period is generally one‑half the time between the effective date of the IND and the date of submission of the NDA, plus the time between the date of submission of the NDA and the date of FDA approval of the product. The maximum period of patent term extension is five years, and the patent cannot be extended to more than 14 years from the date of FDA approval of the product. Only one patent claiming each approved product is eligible for restoration and the patent holder must apply for restoration within 60 days of approval. The U.S. Patent and Trademark Office, in consultation with the FDA, reviews and approves the application for patent term restoration.

Other Regulatory Requirements

After approval, drug products are subject to extensive continuing regulation by the FDA, which include company obligations to manufacture products in accordance with current GMP, maintain and provide to the FDA updated safety and efficacy information, report adverse experiences with the product, keep certain records and submit periodic reports, obtain FDA approval of certain manufacturing or labeling changes, and comply with FDA promotion and advertising requirements and restrictions. Failure to meet these obligations can result in various adverse consequences, both voluntary and FDA-imposed, including product recalls, withdrawal of approval, restrictions on marketing, and the imposition of civil fines and criminal penalties against the NDA holder. In addition, later discovery of previously unknown safety or efficacy issues may result in restrictions on the product, manufacturer or NDA holder.

We and any manufacturers of our products are required to comply with applicable FDA manufacturing requirements contained in the FDA's current GMP regulations. Current GMP regulations require, among other things, quality control and quality assurance as well as the corresponding maintenance of records and documentation. The manufacturing facilities for our products must meet current GMP requirements to the satisfaction of the FDA pursuant to a pre-approval inspection before we can use them to manufacture our products. We and any third-party manufacturers are also subject to periodic inspections of facilities by the FDA and other authorities, including procedures and operations used in the testing and manufacture of our products to assess our compliance with applicable regulations.

With respect to post-market product advertising and promotion, the FDA imposes a number of complex regulations on entities that advertise and promote pharmaceuticals, which include, among others, standards for direct-to-consumer advertising, prohibitions on promoting drugs for uses, conditions or diseases, or in patient populations that are not consistent with the drug's approved labeling (known as "off-label use"), and principles governing industry-sponsored scientific and educational activities. Failure to comply with FDA requirements can have negative consequences, including adverse publicity, warning or untitled letters from the FDA, mandated corrective advertising or communications with doctors or patients, and civil or criminal penalties. Although physicians may prescribe legally available drugs for off-label uses, manufacturers may not market or promote such off-label uses.

Changes to some of the conditions established in an approved application, including changes in indications, labeling, or manufacturing processes or facilities, require submission and FDA approval of a new NDA or NDA supplement before the change can be implemented. An NDA supplement for a new indication typically requires clinical data similar in type and quality to the clinical data supporting the original application for the original indication, and the FDA uses similar procedures and actions in reviewing such NDA supplements as it does in reviewing NDAs.

Adverse event reporting and submission of periodic reports is required following FDA approval of an NDA. The FDA also may require post-marketing testing, known as Phase IV testing, risk evaluation and mitigation strategies, and surveillance to monitor the effects of an approved product or to place conditions on an approval that restrict the distribution or use of the product.

Outside the U.S., our and our collaborators' abilities to market a product are contingent upon receiving marketing authorization from the appropriate regulatory authorities. The requirements governing the conduct of clinical trials, marketing authorization, pricing and reimbursement vary widely from jurisdiction to jurisdiction. At present, foreign marketing authorizations are applied for at a national level, although within the E.U. registration procedures are available to companies wishing to market a product in more than one E.U. member state. We are subject to U.S. federal and foreign anti-corruption laws. Those laws include the U.S. Foreign Corrupt Practices Act, or FCPA, which prohibits U.S. corporations and their representatives from offering, promising, authorizing, or making payments to any foreign government official, government staff member, political party or political candidate in an attempt to obtain or retain business abroad. The scope of the FCPA encompasses certain healthcare professionals in many countries. We are also subject to similar laws of other countries that have enacted anti-corruption laws and regulations.

Pricing and Reimbursement

Within the U.S., significant uncertainty exists regarding the coverage and reimbursement status of products approved by the FDA. Sales of our products depend, in part, on the extent to which our products will be covered by third-party payors, such as government health programs, commercial insurance and managed healthcare organizations. The process for determining whether a third-party payor will provide coverage for a drug product typically is separate from the process for setting the price of a drug product or for establishing the reimbursement rate that the payor will pay for the drug product once coverage is approved. Third-party payors may limit coverage to specific drug products on an approved list, also known as a formulary, which might not include all of the FDA-approved drugs for a particular indication. A decision by a third-party payor not to cover our products or to restrict coverage of our products could reduce utilization of our products. Moreover, a third-party payor's decision to provide coverage for a drug product does not imply that an adequate reimbursement rate will be approved. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development. Additionally, coverage and reimbursement for drug products can differ significantly from payor to payor. One third-party payor's decision to cover a particular drug product or service does not ensure that other payors will also provide coverage for the medical product or service, or will provide coverage at an adequate reimbursement rate.

The containment of healthcare costs has become a priority of federal and state governments, and the prices of drugs have been a focus in this effort. Federal and state governments have shown significant interest in implementing cost-containment programs, including restrictions on reimbursement and requirements for substitution of generic products. Adoption of new or enhanced cost-containment measures could limit our net revenue and results. Third party payors are increasingly challenging the prices charged for medical products and services and examining the medical necessity and cost effectiveness of medical products and services, in addition to their safety and efficacy. Restrictions in coverage or decreases in third-party reimbursement for our products could have a material adverse effect on our sales, results of operations and financial condition. We expect that the pharmaceutical industry will experience pricing pressures due to the increasing influence of managed care (and related implementation of managed care strategies to control utilization), additional federal and state legislative and regulatory proposals to regulate pricing of drugs, limit coverage of drugs or reduce reimbursement for drugs, and public scrutiny of drug pricing. While we cannot predict what executive, legislative and regulatory proposals will be adopted or other actions will occur, such events could have a material adverse effect on our business, financial condition and profitability. For additional information relating to pricing and reimbursement, see Item 1A, Risk Factors, elsewhere in this Annual Report on Form 10-K.

Sales and Marketing

The marketing and sale of pharmaceutical products are subject to comprehensive governmental regulation both within and outside the U.S.

Within the U.S., numerous federal, state and local authorities have jurisdiction over, or enforce laws related to, such activities, including the FDA, U.S. Drug Enforcement Agency, Centers for Medicare & Medicaid Services, the U.S. Department of Health and Human Services Office of Inspector General, the U.S. Department of Justice, state Attorneys General, state departments of health and state pharmacy boards.

We are subject to the requirements of the FDC Act and accompanying regulations that prohibit pharmaceutical companies from promoting a drug prior to approval from the FDA and from promoting an approved drug in a manner inconsistent with the approved label.

We are also subject to various federal and state laws pertaining to health care "fraud and abuse," including anti-kickback laws and false claims laws, for activities related to sales of any of our products or product candidates that may in the future receive marketing approval. Anti-kickback laws generally prohibit persons from soliciting, receiving or providing remuneration, directly or indirectly, to induce either the referral of an individual, for an item or service or the purchasing or ordering of a good or service, for which payment may be made under federal healthcare programs such as Medicare and Medicaid. Although the specific provisions of these laws vary, their scope is generally broad and there may not be regulations, guidance or court decisions that apply the laws to particular industry practices. False claims laws prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, information or claims for payment from Medicare, Medicaid, or other third-party payers that are false or fraudulent. Violations of fraud and abuse laws may be punishable by criminal or civil sanctions, including fines and civil monetary penalties, and/or exclusion from federal health care programs (including Medicare and Medicaid).

Laws and regulations have been enacted by the federal government and various states to regulate the sales and marketing practices of pharmaceutical manufacturers with marketed products. The laws and regulations generally limit financial interactions between manufacturers and health care providers and/or require disclosure to the government and public of such interactions. Many of these laws and regulations contain ambiguous requirements or require administrative guidance for implementation.

Employees

As of December 31, 2018, we had 515 employees. Approximately 26 were scientists engaged in discovery research, 173 were in our drug development organization, 214 were in our sales and commercial team, and 102 were in general and administrative functions. None of our employees are represented by a labor union, and we consider our employee relations to be good.

During the year ended December 31, 2018, we commenced certain reductions in our workforce. In February 2019, following further analysis of our strategy and core business needs, and in an effort to further strengthen the operational efficiency of its organization, we commenced a reduction in our workforce by 35 employees, primarily based

in the home office. Refer to Note 18, *Workforce Reduction* and Note 20, *Subsequent Events* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K for further details.

Certain Ironwood employees are expected to transition to Cyclerion upon the planned separation into two, independent publicly traded companies.

Executive Officers of the Registrant

The following table sets forth the name, age and position of each of our executive officers as of February 25, 2019:

Name	Age	Position
Peter M. Hecht, Ph.D.	55	Chief Executive Officer, Director
Gina Consylman, CPA	46	Senior Vice President, Chief Financial Officer, and Treasurer
Mark G. Currie, Ph.D.	64	Senior Vice President, Chief Scientific Officer and President of R&D
Halley E. Gilbert	49	Senior Vice President, Chief Legal Officer, and Secretary
William Huyett	63	Chief Operating Officer
Mark Mallon	56	Senior Executive Advisor
Thomas A. McCourt	61	Senior Vice President, Marketing and Sales and Chief Commercial Officer

Peter M. Hecht has served as our chief executive officer and a director since co-founding the company in 1998, during which he has built a highly respected leadership team and culture that worked together to discover, develop and commercialize LINZESS ®, a novel first-in-mechanism therapeutic that quickly became the branded prescription market leader in its class and has been taken by millions of patients for irritable bowel syndrome with constipation and chronic idiopathic constipation. Additionally, the team has pioneered new areas of science, produced a development portfolio with multiple innovative drug candidates, and established a valuable network of global partnerships. Through a combination of private and public equity, structured debt, and partnerships, Dr. Hecht and his team raised over one billion dollars to fund these efforts. Prior to founding Ironwood, Dr. Hecht was a research fellow at Whitehead Institute for Biomedical Research. Dr. Hecht serves on the advisory board of Ariadne Labs. He earned a B.S. in mathematics and an M.S. in biology from Stanford University, and holds a Ph.D. in molecular biology from the University of California at Berkeley. Dr. Hecht's experiences as one of our founders and his tenure as our chief executive officer make him a valuable member of our board of directors.

Gina Consylman has served as our senior vice president, chief financial officer since November 2017. Ms. Consylman previously served as our interim Chief Financial Officer from September 2017 to November 2017, and as our Vice President of Finance and Chief Accounting Officer from August 2015 to November 2017. She also previously served as our Vice President, Corporate Controller and Chief Accounting Officer from June 2014 to July 2015. Ms. Consylman currently serves on the Board of Directors of Verastem Oncology. Prior to joining Ironwood, Ms. Consylman served as Vice President, Corporate Controller and Principal Accounting Officer of Analogic Corporation (which was acquired by funds affiliated with Altaris Capital Partners, LLC), a publicly held healthcare and security technology solutions company, from February 2012 to June 2014, where she oversaw Analogic's global accounting team. Prior to joining Analogic, Ms. Consylman served in various corporate accounting roles at Biogen Inc., a publicly held global biotechnology company, from November 2009 to February 2012, culminating in her service as Senior Director, Corporate Accounting where she was responsible for the accounting teams for the corporate and U.S. commercial business units. Ms. Consylman has also served in various other finance and accounting roles, including Corporate Controller at Varian Semiconductor Equipment Associates, Inc. (subsequently acquired by Applied Materials, Inc.). Ms. Consylman, a Certified Public Accountant, began her career in public accounting at Ernst & Young LLP. She holds a B.S. in accounting from Johnson & Wales University and a M.S. in taxation from Bentley University.

Mark G. Currie serves as our senior vice president, chief scientific officer and president of research and development, and has led our research and development efforts since joining us in 2002. Prior to joining Ironwood, Dr. Currie directed cardiovascular and central nervous system disease research as vice president of discovery research at Sepracor Inc. Previously, Dr. Currie initiated, built and led discovery pharmacology and also served as director of arthritis and inflammation at Monsanto Company. Dr. Currie earned a B.S. in biology from the University of South Alabama and holds a Ph.D. in cell biology from the Bowman-Gray School of Medicine of Wake Forest University.

Halley E. Gilbert joined Ironwood in 2008 as the founding member of our legal department, and also established our company's compliance function as Ironwood grew from a privately-held, research-based organization to a publicly-traded, fully-integrated commercial biotechnology company. Ms. Gilbert has over twenty years of experience navigating biopharmaceutical companies through transformational change, as well as expertise in corporate transactions, corporate governance, employment law and legal and operational issues relevant to launching new medicines into specialty and primary care markets. Prior to joining Ironwood, Ms. Gilbert was Vice President, Deputy General Counsel at Cubist Pharmaceuticals, Inc. from 2002 to 2008, where she supported the launch of Cubist's first acute care antibiotic, and she served as Corporate Counsel at Genzyme Corp. from 1999 to 2001. Ms. Gilbert began her career at Skadden, Arps, Slate, Meagher & Flom LLP, where she specialized in mergers and acquisitions and securities law. She serves on the board of directors of Achaogen, Inc., a clinical-stage biopharmaceutical company focused on the development of novel antibacterials, and holds a J.D. from Northwestern University School of Law and a B.A. from Tufts University.

William Huyett serves as our chief operating officer. Prior to joining Ironwood in December 2017, Mr. Huyett spent 30 years with McKinsey and Company, Inc., in its Washington D.C., Zurich, and Boston offices. During his tenure at McKinsey, Mr. Huyett served clients in the life sciences, industrial and other technology-intensive sectors. He has been a Senior Partner Emeritus at McKinsey since December 2015, and was previously a Senior Partner from July 1998 to December 2015. As a Senior Partner, Mr. Huyett was a leader in the firm's pharmaceutical and medical products and its strategy and corporate finance practices. He also served on McKinsey's Shareholder's Council (its board of directors), serving as chair of its Finance Committee. Prior to joining McKinsey, Mr. Huyett held a variety of line management positions in the automation industry with Allen-Bradley (now Rockwell Automation, Inc.). Mr. Huyett is the non-executive chair of the board of directors of the London Stock Exchange-listed Georgia Healthcare Group PLC and an independent director of the London Stock Exchange-listed Georgia Capital. He serves on several not-for-profit boards, including The Rockefeller University and the Marine Biological Laboratory in Woods Hole, Massachusetts. He earned his B.S. in electronics engineering and his M.B.A. from the University of Virginia.

Mark Mallon serves as executive senior advisor to Ironwood. Prior to joining Ironwood in January 2019, Mr. Mallon was a member of the senior executive team of AstraZeneca PLC and led its strategic functions, Global Product and Portfolio Strategy, Global Medical Affairs, and Corporate Affairs. Mr. Mallon held a number of senior sales and marketing roles at AstraZeneca, which he joined in 1994, including Executive Vice President, International from January 2013 to April 2017 and Executive Vice President, Global Product and Portfolio Strategy from August 2016 to December 2018. Mr. Mallon started his career in the biopharmaceutical industry in management consulting. He earned his B.S. in chemical engineering from the University of Pennsylvania and his M.B.A. in marketing and finance from the Wharton School of Business.

Thomas A. McCourt has served as our senior vice president of marketing and sales and chief commercial officer since joining Ironwood in 2009. Prior to joining Ironwood, Mr. McCourt led the U.S. brand team for denosumab at Amgen Inc. from April 2008 to August 2009. Prior to that, Mr. McCourt was with Novartis AG from 2001 to 2008, where he directed the launch and growth of Zelnorm for the treatment of patients with IBS-C and CIC and held a number of senior commercial roles, including vice president of strategic marketing and operations. Mr. McCourt was also part of the founding team at Astra Merck Inc., leading the development of the medical affairs and science liaison group and then serving as brand manager for Prilosec ® and NEXIUM ® . Mr. McCourt serves on the board of directors of Acceleron Pharma Inc. and has a degree in pharmacy from the University of Wisconsin.

Available Information

You may obtain free copies of our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, and amendments to those reports, as soon as reasonably practicable after they are electronically filed or furnished to the SEC, on the Investors section of our website at www.ironwoodpharma.com or by contacting our Investor Relations department at (617) 374-5082. The contents of our website are not incorporated by reference into this report and you should not consider information provided on our website to be part of this report.

Item 1A. ***Risk Factors***

In addition to the other information in this Annual Report on Form 10-K, any of the factors described below could significantly and negatively affect our business, financial condition, results of operations or prospects. The trading price of our common stock may decline due to these risks.

Risks Related to Our Business and Industry

We are highly dependent on the commercial success of LINZESS in the U.S. for the foreseeable future; we cannot guarantee when, or if, we will attain profitability or positive cash flows.

We and our partner, Allergan plc (together with its affiliates), or Allergan, began selling LINZESS in the U.S. during December 2012. Revenues from our LINZESS collaboration constitute a significant portion of our total revenue, and we believe they will continue to do so for the foreseeable future. The commercial success of LINZESS depends on a number of factors, including:

- the effectiveness of LINZESS as a treatment for adult patients with IBS-C or CIC;
- the size of the treatable patient population;
- the effectiveness of the sales, managed markets and marketing efforts by us and Allergan;
- the adoption of LINZESS by physicians, which depends on whether physicians view it as safe and effective treatment for adult patients with IBS-C and CIC;
- our success in educating and activating adult IBS-C and CIC patients to enable them to more effectively communicate their symptoms and treatment history to their physicians;
- our ability to both secure and maintain adequate reimbursement for, and optimize patient access to, LINZESS and our ability to demonstrate that LINZESS is safer, more efficacious and/or more cost-effective than alternative therapies;
- the effectiveness of our partners' distribution networks;
- the occurrence of any side effects, adverse reactions or misuse, or any unfavorable publicity in these or other areas, associated with linaclotide; and
- the development or commercialization of competing products or therapies for the treatment of IBS-C or CIC, or their associated symptoms.

Our revenues from the commercialization of LINZESS are subject to these factors, and therefore may be unpredictable from quarter-to-quarter. Ultimately, we may never generate sufficient revenues from LINZESS to reach or maintain profitability for our company or to sustain our anticipated levels of operations.

Our products may cause undesirable side effects or have other properties that could limit their commercial potential.

The most commonly reported adverse reaction since linaclotide became commercially available, as well as in the clinical trials for linaclotide in IBS-C and CIC, has been diarrhea. In the linaclotide Phase III IBS-C and CIC trials, severe diarrhea was reported in 2% or less of the linaclotide-treated patients and its incidence was similar between the IBS-C and CIC populations. Linaclotide has been prescribed to millions of patients since its launch in the U.S. and other territories beginning in December 2012, and, as a result, it has been used in wider populations and in less rigorously controlled environments than in the clinical studies supporting its approval.

Further, as we and our partners conduct clinical trials, including in new or existing territories, indications, populations or formulations, as well as explore potential combination products, the number of patients treated with our products within and outside of such products' currently approved indications and patient populations has grown and continues to do so.

As patient experience increases and expands, we and others may identify previously unknown side effects, known side effects may be found to be more frequent or severe than in the past, and we and others may detect unexpected safety signals for our products or any products perceived to be similar to our products. The foregoing, or the perception of the foregoing, may have the following effects, among others:

- sales of our products may be impaired;
- regulatory approvals for our products may be denied, restricted or withdrawn;
- we or our partners may decide to, or be required to, change the products' label or send product warning letters or field alerts to physicians, pharmacists and hospitals;
- reformulation of the products, additional nonclinical or clinical studies, changes in labeling or changes to or re-approvals of manufacturing facilities may be required;
- we or our partners may be precluded from pursuing approval of linaclotide in new territories or from studying additional development opportunities to enhance our products' clinical profiles, including within new or existing indications, populations and formulations, as well as in potential combination products;
- our or our products' reputation in the marketplace may suffer; and
- government investigations or lawsuits, including class action suits, may be brought against us or our partners.

Any of the above occurrences would harm or prevent sales of our products, increase expenses and impair our and our partners' ability to successfully commercialize our products.

In June 2016, we entered into a license agreement for exclusive rights to commercialize products containing lesinurad in the U.S., which license agreement we refer to as the Lesinurad License Agreement, and in August 2018, delivered to AstraZeneca a notice of termination of the Lesinurad License Agreement, which termination was made with respect to all products under the lesinurad license agreement. The most commonly reported adverse reactions in the clinical trials for lesinurad (in combination with a xanthine oxidase inhibitor, or XOI) for the treatment of hyperuricemia associated with uncontrolled gout were headache, influenza, increased blood creatinine and gastroesophageal reflux disease. ZURAMPIC and DUZALLO were launched in October 2016 and October 2017, respectively. As a result, such products have been used in wider populations and in less rigorously controlled environments than in the clinical studies supporting their approval. Additionally, because such products are approved for use in combination with an XOI for the treatment of hyperuricemia associated with uncontrolled gout, and DUZALLO is a fixed-dose combination treatment of lesinurad and allopurinol (an XOI), our patients may experience side effects and adverse reactions associated with the use of XOIs. Notwithstanding ZURAMPIC's U.S. Food and Drug Administration, or FDA, -approved label, if ZURAMPIC is taken without an XOI, patients may experience new or increased risk of adverse reactions, including the heightened risk of acute renal failure.

In addition, LINZESS, ZURAMPIC and DUZALLO each contain a boxed warning about their use. The FDA-approved label for LINZESS contains a boxed warning about its use in pediatric patients. LINZESS is contraindicated in pediatric patients up to six years of age based on nonclinical data from studies in neonatal mice approximately equivalent to human pediatric patients less than two years of age. There is also a warning advising physicians to avoid the use of LINZESS in pediatric patients six to less than 18 years of age. This warning is based on data in young juvenile mice and the lack of clinical safety and efficacy data in pediatric patients of any age group. We and Allergan have established a nonclinical and clinical post-marketing plan with the FDA to understand the safety and efficacy of LINZESS in pediatric patients, which is discussed below.

The FDA-approved label for DUZALLO contains a boxed warning about the risk of acute renal failure with DUZALLO, and the FDA-approved label for ZURAMPIC contains a boxed warning about the risk of acute renal failure with ZURAMPIC, which is more common when ZURAMPIC is used without an XOI. ZURAMPIC and DUZALLO are both contraindicated in patients with severe renal impairment or end-stage renal diseases, kidney transplant recipients, patients on dialysis or patients with tumor lysis syndrome or Lesch-Nyhan syndrome. In addition, DUZALLO is contraindicated in patients with a known hypersensitivity to allopurinol. The FDA has required that a post-marketing clinical study be conducted to further evaluate the renal and cardiovascular safety of lesinurad, which is discussed below.

We rely entirely on contract manufacturers, our partners and other third parties to manufacture and distribute linaclotide. If they are unable to comply with applicable regulatory requirements, unable to source sufficient raw materials, experience manufacturing or distribution difficulties, or are otherwise unable to manufacture and distribute sufficient quantities to meet demand, our commercialization efforts may be materially harmed.

We have no internal manufacturing or distribution capabilities. Instead, we rely on a combination of contract manufacturers and our partners to manufacture active pharmaceutical ingredient, or API, and final drug product. We rely on our partners to store and distribute linaclotide to third party purchasers. We and certain of our partners have commercial supply agreements with independent third parties to manufacture the linaclotide API used to support all of our partnered territories. Each of Allergan and Astellas is responsible for linaclotide drug product and finished goods manufacturing (including bottling and packaging) for its respective territories, and distributing the finished goods to wholesalers. Under our collaboration with AstraZeneca, we are accountable for drug product and finished goods manufacturing for China, for drug product manufacturing for Hong Kong and Macau, with AstraZeneca accountable for finished goods manufacturing for Hong Kong and Macau. Neither we nor AstraZeneca have experience manufacturing linaclotide on a commercial scale and we and AstraZeneca are working to achieve sufficient redundancy in this component of the linaclotide supply chain.

Each of our API and drug product manufacturers must comply with current good manufacturing practices, or GMP, and other stringent regulatory requirements enforced by the FDA and foreign regulatory authorities in other jurisdictions. These requirements include, among other things, quality control, quality assurance and the maintenance of records and documentation, which occur in addition to our own quality assurance releases. Manufacturers of our products may be unable to comply with these GMP requirements and with other regulatory requirements. We have little control over our manufacturers' or partners' compliance with these regulations and standards.

Our manufacturers may experience problems with their respective manufacturing and distribution operations and processes, including for example, quality issues, such as product specification and stability failures, procedural deviations, improper equipment installation or operation, utility failures, contamination and natural disasters. In addition, the raw materials necessary to make API for our products are acquired from a limited number of sources. Any delay or disruption in the availability of these raw materials or a change in raw material suppliers could result in production disruptions, delays or higher costs with consequent adverse effects on us.

The manufacture of pharmaceutical products requires significant expertise and capital investment, including the development of advanced manufacturing techniques and process controls. Manufacturers of pharmaceutical products often encounter difficulties in commercial production. These problems include difficulties with production costs and yields, quality control, including stability of the product and quality assurance testing, and shortages of qualified personnel, as well as compliance with federal, state and foreign regulations and the challenges associated with complex supply chain management. Even if our manufacturers or partners do not experience problems and commercial manufacturing is achieved, their maximum or available manufacturing capacities may be insufficient to meet commercial demand. Finding alternative manufacturers or adding additional manufacturers requires a significant amount of time and involves significant expense. New manufacturers would need to develop and implement the necessary production techniques and processes, which along with their facilities, would need to be inspected and approved by the regulatory authorities in each applicable territory.

If our API or drug product manufacturers fail to adhere to applicable GMP or other regulatory requirements, experience delays or disruptions in the availability of raw materials or experience manufacturing or distribution problems, we will suffer significant consequences, including product seizures or recalls, loss of product approval, fines and sanctions, reputational damage, shipment delays, inventory shortages, inventory write-offs and other product-related charges and increased manufacturing costs. If we experience any of these results, or if our manufacturers' maximum or available capacities are insufficient to meet demand, we may not be able to successfully commercialize our products.

The transition of lesinurad to AstraZeneca has been and continues to be a significant undertaking that could require additional substantial financial and managerial resources, and we may not be successful.

We have encountered and may continue to encounter costs and delays related to transitioning lesinurad to AstraZeneca. We have never undertaken the process of transitioning a marketed product to a third party, and we may encounter challenges and costs that we do not currently anticipate. Our reputation with patients or physicians may be harmed as a result of transitioning lesinurad, and unforeseen complications with the FDA or other regulatory agencies

could arise. In addition, we are still in discussions with AstraZeneca regarding the costs involved in the termination and transition process and have not reached an agreement. If we are unable to reach agreement with AstraZeneca, this could potentially lead to costly administrative procedures or litigation, distract management from other business activities, and could have an adverse impact on our financial condition. For additional information relating to our costs and expenses of exiting lesinurad, see Note 18, *Workforce Reduction* , to our condensed consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

If any of our linaclotide partners undergoes a change in control or in management, this may adversely affect our collaborative relationship or the success of the commercialization of linaclotide in the U.S. or in the other countries where it is approved, or the ability to achieve regulatory approval, launch and commercialize linaclotide in other territories.

We work jointly and collaboratively with each of our partners on many aspects of the development, manufacturing and commercialization of linaclotide. In doing so, we have established relationships with several key members of the management teams of our linaclotide partners in functional areas such as development, quality, regulatory, drug safety and pharmacovigilance, operations, marketing, sales, field operations and medical science. Further, the success of our collaborations is highly dependent on the resources, efforts and skills of our partners and their key employees. As we and our partners commercialize linaclotide in the U.S. and the other countries where it is approved, and develop, launch and commercialize linaclotide in other parts of the world, the drug's success becomes more dependent on us maintaining highly collaborative and well aligned partnerships. If any of our linaclotide partners undergo a change of control or in management in the future, we would need to reestablish many relationships and confirm continued alignment on our development and commercialization strategy for linaclotide. Further, in connection with any change of control or in management, there is inherent uncertainty and disruption in operations, which could result in distraction, inefficiencies, and misalignment of priorities. As a result, in the event of a change of control or in management at one of our linaclotide partners, we cannot be sure that we will be able to successfully execute on our development and commercialization strategy for linaclotide in an effective and efficient manner and without disruption or reduced performance. Finally, any change of control or in management may result in a reprioritization of linaclotide within a partner's portfolio, or such partner may fail to maintain the financial or other resources necessary to continue supporting its portion of the development, manufacturing or commercialization of linaclotide.

If any of our linaclotide partners undergoes a change of control and the acquirer either (i) is unable to perform such partner's obligations under its collaboration or license agreement with us or (ii) does not comply with the divestiture or certain other provisions of the applicable agreement, we have the right to terminate the collaboration or license agreement and reacquire that partner's rights with respect to linaclotide. If we elect to exercise these rights in such circumstances, we will need to either establish the capability to develop, manufacture and commercialize linaclotide in that partnered territory on our own or we will need to establish a relationship with a new partner. We have assembled a team of specialists in manufacturing, quality, sales, marketing, payer, pricing and field operations, and specialized medical scientists, who represent the functional areas necessary for a successful commercial launch of a high potential, gastrointestinal, or GI, therapy and who support the commercialization of LINZESS in the U.S. If Allergan was subject to a change of control that allowed us to further commercialize LINZESS in the U.S. on our own, and we chose to do so, we would need to enhance each of these functional aspects to replace the capabilities that Allergan was previously providing to the collaboration. Any such transition might result in a period of reduced efficiency or performance by our operations and commercialization teams, which could adversely affect our ability to commercialize LINZESS.

Although many members of our global operations, commercial and medical affairs teams have strategic oversight of, and a certain level of involvement in, their functional areas globally, we do not have corresponding operational capabilities in these areas outside of the U.S. If Allergan, Astellas or AstraZeneca was subject to a change of control that allowed us to continue linaclotide's development or commercialization anywhere outside of the U.S. on our own, and we chose to do so rather than establishing a relationship with a new partner, we would need to build operational capabilities in the relevant territory. In any of these situations, the timeline and likelihood of achieving regulatory approval and, ultimately, the commercialization of linaclotide could be negatively impacted.

We must work effectively and collaboratively with Allergan to market and sell LINZESS in the U.S. in order for it to achieve its maximum commercial potential.

We are working closely with Allergan to execute our joint commercialization plan for LINZESS. The commercialization plan includes an agreed upon marketing campaign that targets the physicians who see patients who could benefit from LINZESS treatment. Our marketing campaign also targets the adult men and women who suffer from IBS-C or CIC. Our commercialization plan also includes an integrated call plan for our sales forces to optimize the education of specific gastroenterologists and primary care physicians on whom our and Allergan's sales representatives call, and the frequency with which the representatives meet with them.

In order to optimize the commercial potential of LINZESS, we and Allergan must execute upon this commercialization plan effectively and efficiently. In addition, we and Allergan must continually assess and modify our commercialization plan in a coordinated and integrated fashion in order to adapt to the promotional response. Further, we and Allergan must continue to focus and refine our marketing campaign to ensure a clear and understandable physician-patient dialogue around IBS-C, CIC and the potential for LINZESS as an appropriate therapy. In addition, we and Allergan must provide our sales forces with the highest quality support, guidance and oversight in order for them to continue to effectively promote LINZESS to gastroenterologists and primary care physicians. If we and Allergan fail to perform these commercial functions in the highest quality manner and in accordance with our joint commercialization plan and related agreements, LINZESS will not achieve its maximum commercial potential and we may suffer financial harm. Our efforts to further target and engage adult patients with IBS-C or CIC may not effectively increase appropriate patient awareness or patient/physician dialogue, and may not increase the revenues that we generate from LINZESS.

We are subject to uncertainty relating to pricing and reimbursement policies in the U.S. which, if not favorable for our products, could hinder or prevent our products' commercial success.

Our and our partner's ability to commercialize our products successfully depend in part on the coverage and reimbursement levels set by governmental authorities, private health insurers and other third-party payers. In determining whether to approve reimbursement for our products and at what level, we expect that third-party payers will consider factors that include the efficacy, cost effectiveness and safety of our products, as well as the availability of other treatments including generic prescription drugs and over-the-counter alternatives. Further, in order to obtain and maintain acceptable reimbursement levels and access for patients at copay levels that are reasonable and customary, we may face increasing pressure to offer discounts or rebates from list prices or discounts to a greater number of third-party payers or other unfavorable pricing modifications. Obtaining and maintaining favorable reimbursement can be a time consuming and expensive process, and there is no guarantee that we or Allergan will be able to negotiate or continue to negotiate pricing terms with third-party payers at levels that are profitable to us, or at all. Certain third-party payers also require prior authorization for, or even refuse to provide, reimbursement for our products, and others may do so in the future. Our business would be materially adversely affected if we and our partners are not able to receive approval for reimbursement of our products from third-party payers on a broad, timely or satisfactory basis; if reimbursement is subject to overly broad or restrictive prior authorization requirements; or if reimbursement is not maintained at satisfactory levels or becomes subject to prior authorization. In addition, our business could be adversely affected if government healthcare programs, private health insurers, including managed care organizations, or other reimbursing bodies or payers limit or reduce the indications for or conditions under which our products may be reimbursed.

We expect to experience pricing pressures in connection with the sale of our current and future products due to the healthcare reforms discussed below, as well as the trend toward programs aimed at reducing healthcare costs, the increasing influence of managed care, the scrutiny of pharmaceutical pricing, the ongoing debates on reducing government spending and additional legislative proposals. There have been several recent federal and state efforts to address drug costs, which generally have focused on increasing transparency around drug costs or limiting drug prices or price increases. Healthcare reform efforts or any future legislation or regulatory actions aimed at controlling and reducing healthcare costs, including through measures designed to limit reimbursement, restrict access or impose unfavorable pricing modifications on pharmaceutical products, could impact our and our partners' ability to obtain or maintain reimbursement for our products at satisfactory levels, or at all, which could materially harm our business and financial results.

We and our linaclotide partners are subject to uncertainty relating to pricing and reimbursement policies outside the U.S., as well as risks relating to the improper importation of linaclotide and sale of counterfeit versions of linaclotide. If such policies are not favorable, or if linaclotide is improperly imported or is counterfeited, our business and financial results could be adversely affected.

In some foreign countries, particularly Canada, the countries of Europe and Japan, the pricing and payment of prescription pharmaceuticals is subject to governmental control. In these countries, pricing negotiations with governmental authorities can take six to 12 months or longer after the receipt of regulatory approval and product launch. Reimbursement sources are different in each country, and each country may include a combination of distinct potential payers, including private insurance and governmental payers. Some countries may restrict the range of medicinal products for which their national health insurance systems provide reimbursement and control the prices of medicinal products for human use. To obtain favorable reimbursement for the indications sought or pricing approval in some countries, we and our partners may be required to conduct a clinical trial that compares the cost and clinical effectiveness of linaclotide to other available therapies. In addition, in countries in which linaclotide is the only approved therapy for a particular indication, such as CONSTELLA as the only prescription product approved for the symptomatic treatment of moderate to severe IBS-C in adults in Europe and LINZESS as the only prescription treatment approved for the treatment of adults with IBS-C in Japan, there may be disagreement as to what the most comparable product is, or if there even is one. Further, several countries have implemented government measures to either freeze or reduce pricing of pharmaceutical products. Many third-party payers and governmental authorities also consider the price for which the same product is being sold in other countries to determine their own pricing and reimbursement strategy, so if linaclotide is priced low or gets limited reimbursement in a particular country, this could result in similarly low pricing and reimbursement in other countries. If reimbursement for linaclotide is unavailable in any country in which reimbursement is sought, limited in scope or amount, or if pricing is set at or reduced to unsatisfactory levels, our and our partners' ability to successfully commercialize linaclotide in such country would be impacted negatively. Furthermore, if these measures prevent us or any of our partners from selling linaclotide on a profitable basis in a particular country, they could prevent the commercial launch or continued sale of linaclotide in that country.

CONSTELLA was first launched in certain European countries for the symptomatic treatment of moderate to severe IBS-C in adults in the second quarter of 2013 and our partner Allergan is currently commercializing CONSTELLA in a number of European countries, including the United Kingdom, Italy and Spain. LINZESS was first launched in Japan for the treatment of IBS-C in adults in the first quarter of 2017, and for the treatment of chronic constipation in adults in the third quarter of 2018, and our partner Astellas is currently commercializing LINZESS in Japan. The pricing and reimbursement strategy is a key component of our partners' commercialization plans for CONSTELLA in Europe and LINZESS in Japan. Our revenues may suffer if our partners are unable to successfully and timely conclude reimbursement, price approval or funding processes and market CONSTELLA in key member states of the E.U. or LINZESS in Japan, or if coverage and reimbursement for either CONSTELLA or LINZESS is limited or reduced. If our partners are not able to obtain coverage, pricing or reimbursement on acceptable terms or at all, or if such terms change in any countries in its territory, our partners may not be able to, or may decide not to, sell either CONSTELLA or LINZESS in such countries.

We and our partners also face the risk that linaclotide is imported or reimported into markets with relatively higher prices from markets with relatively lower prices, which would result in a decrease of sales and any payments we receive from the affected market. Additionally, third parties may illegally produce, distribute and/or sell counterfeit or otherwise unfit or adulterated versions of linaclotide. In either case, we and our partners may not be able to detect or, if detected, prevent or prohibit the sale of such products, which could result in dangerous health consequences for patients, loss of confidence in us, our partners and our products, and adverse regulatory or legal consequences. Any of the foregoing or other consequences could adversely impact our reputation, financial results and business.

Because we work with partners to develop, manufacture and commercialize our products, we are dependent upon third parties, and our relationships with those third parties, in our efforts to obtain regulatory approval for, and to commercialize, our products, as well as to comply with regulatory and other obligations with respect to such products.

Allergan played a significant role in the conduct of the clinical trials for linaclotide and in the subsequent collection and analysis of data, and Allergan holds the new drug application, or NDA, for LINZESS. In addition, we are commercializing LINZESS in the U.S. with Allergan. Allergan is also responsible for the development, regulatory approval and commercialization of linaclotide in countries worldwide other than Japan, China, Hong Kong and Macau. Allergan is commercializing LINZESS in Mexico and CONSTELLA in Canada, as well as commercializing

CONSTELLA in certain countries in Europe. Astellas, our partner in Japan, is responsible for completing the clinical programs and obtaining regulatory approval of linaclotide in its territory. Astellas is commercializing LINZESS in Japan. Further, we are jointly overseeing the development, and will jointly oversee the commercialization, of linaclotide in China, Hong Kong and Macau through our collaboration with AstraZeneca, with AstraZeneca having primary responsibility for the local operational execution. Each of Astellas, AstraZeneca and Allergan is responsible for commercializing linaclotide in its respective territory, if approved. Each of our partners is responsible for reporting adverse event information from its territory to us. Finally, each of our partners, other than AstraZeneca, is responsible for drug product manufacturing of linaclotide and making it into finished goods (including bottling and packaging) for its respective territory, and AstraZeneca is responsible for finished goods manufacturing for China, Hong Kong and Macau. The integration of our efforts with our partners' efforts is subject to the uncertainty of the markets for pharmaceutical products in each partner's respective territories, and accordingly, these relationships must evolve to meet any new challenges that arise in those regions.

These integrated functions may not be carried out effectively and efficiently if we fail to communicate and coordinate with our linaclotide partners, and vice versa. Our linaclotide partnering strategy imposes obligations, risks and operational requirements on us as the central node in our global network of partners. If we do not effectively communicate with each partner and ensure that the entire network is making integrated and cohesive decisions focused on the global brand for linaclotide, linaclotide will not achieve its maximum commercial potential. Further, we have limited ability to control the amount or timing of resources that our partners devote to linaclotide. If any of our partners fails to devote sufficient time and resources to linaclotide, or if its performance is substandard, it will delay the potential submission or approval of regulatory applications for linaclotide, as well as the manufacturing and commercialization of linaclotide in the particular territory. A material breach by any of our partners of our collaboration or license agreement with such partner, or a significant disagreement between us and a partner, could also delay the regulatory approval and commercialization of linaclotide, potentially lead to costly litigation, and could have a material adverse impact on our financial condition. Moreover, although we have non-compete restrictions in place with each of our linaclotide partners, they may have competitive products or relationships with other commercial entities, some of which may compete with us. If any of our partners competes with us or assists our competitors, it could harm our competitive position.

In addition, adverse event reporting requires significant coordination with our partners and third parties. We are the holder of the global safety database for linaclotide responsible for coordinating the safety surveillance and adverse event reporting efforts worldwide with respect to linaclotide, and an AstraZeneca partner is the holder of the global safety database for lesinurad responsible for coordinating the safety surveillance and adverse event reporting efforts worldwide with respect to lesinurad. If we or AstraZeneca's partner fails to perform such activities and maintain each safety database or if such parties do not report adverse events related to our products, or fail to do so in a timely manner, we may not receive the information that we are required to report to the FDA regarding such products. Furthermore, we or such parties may fail to adequately monitor, identify or investigate adverse events, or to report adverse events to the FDA or foreign regulatory authority accurately and within the prescribed timeframe. If we or such parties are unsuccessful in any of the foregoing due to poor process, execution, systems, oversight, communication, adjudication or otherwise, then we may suffer any number of consequences, including the imposition of additional restrictions on the use of our products, removal of our products from the market, criminal prosecution, the imposition of civil monetary penalties, seizure of our products, or delay in approval of future products.

Even though LINZESS is approved by the FDA, it faces post-approval development and regulatory requirements, which present additional challenges.

In August 2012, the FDA approved LINZESS as a once-daily treatment for adult men and women suffering from IBS-C or CIC. LINZESS is subject to ongoing FDA requirements, including those governing the testing, manufacturing, labeling, packaging, storage, advertising, promotion, sale, distribution, recordkeeping and submission of safety and other post-market information.

LINZESS is contraindicated in pediatric patients up to six years of age based on nonclinical data from studies in neonatal mice approximately equivalent to human pediatric patients less than two years of age. There is also a boxed warning advising physicians to avoid the use of LINZESS in pediatric patients six to less than 18 years of age. This warning is based on data in young juvenile mice and the lack of clinical safety and efficacy data in pediatric patients of any age group. We and Allergan have established a nonclinical and clinical post-marketing plan with the FDA to understand the safety and efficacy of LINZESS in pediatric patients, are advancing clinical pediatric programs in IBS-C patients age seven to 17 and functional constipation patients age six to 17. Our ability to conduct clinical studies in

younger pediatric patients will depend, in part, on the safety and efficacy data from our clinical programs in older pediatric patients. Our ability to ever expand the indication or label information for LINZESS to pediatrics will depend on, among other things, our successful completion of pediatric clinical programs. We and Allergan have also committed to certain nonclinical and clinical studies aimed at understanding: (a) whether orally administered linaclotide can be detected in breast milk, (b) the potential for antibodies to be developed to linaclotide, and if so, (c) whether antibodies specific for linaclotide could have any therapeutic or safety implications. We expect to complete these studies over the next two to four years.

In addition, as the holder of the approved NDA for each of ZURAMPIC and DUZALLO, we are obligated to monitor and report adverse events and any failure of such products to meet the specifications in the applicable NDA, to submit new or supplemental applications and to obtain FDA approval for certain changes to such products, including changes to product labeling and manufacturing processes. The FDA has required a post-marketing clinical study to further evaluate the renal and cardiovascular safety of lesinurad, and has required that enrollment include patients with moderate renal impairment. In connection with the exit of the lesinurad license, we are in the process of ending the post-marketing clinical study.

These post-approval requirements impose burdens and costs on us. Failure to effectively, appropriately and timely conduct and complete the required studies relating to our products, monitor and report adverse events and meet our other post-approval commitments would lead to negative regulatory action at the FDA, which could include withdrawal of regulatory approval of our products for their currently approved indications and patient populations.

Manufacturers of drug products and their facilities are subject to continual review and periodic inspections by the FDA and other regulatory authorities for compliance with GMP and other applicable regulations. If we or a regulatory agency discovers previously unknown problems with a product, such as adverse events of unanticipated severity or frequency, or problems with a facility where the product is manufactured, a regulatory agency may impose restrictions on that product or the manufacturer, including withdrawal of the product from the market or suspension of manufacturing. If we, our partners or the manufacturing facilities for our products fail to comply with applicable regulatory requirements, a regulatory agency may take the following actions, among others:

- issue warning letters or untitled letters;
- impose civil or criminal penalties;
- suspend or withdraw regulatory approval;
- suspend any ongoing clinical trials;
- refuse to approve pending applications or supplements to applications submitted by us or our partners;
- impose restrictions on operations, including costly new manufacturing requirements; or
- seize or detain products or require us to initiate a product recall.

Even though linaclotide is approved for marketing in the U.S. and in a number of other countries, we or our partners may never receive approval to commercialize linaclotide in additional parts of the world.

In order to market any products outside of the countries where linaclotide is currently approved, we or our partners must comply with numerous and varying regulatory requirements of other jurisdictions regarding, among other things, safety and efficacy. Approval procedures vary among jurisdictions and can involve product testing and administrative review periods different from, and greater than, those in the U.S. and the other countries where linaclotide is approved. Potential risks include that the regulatory authorities:

- may not deem linaclotide safe and effective;
- may not find the data from nonclinical studies and clinical trials sufficient to support approval;
- may not approve of manufacturing processes and facilities;

- may not approve linaclotide for any or all indications or patient populations for which approval is sought;
- may require significant warnings or restrictions on use to the product label for linaclotide; or
- may change their approval policies or adopt new regulations.

If any of the foregoing were to occur, our receipt of regulatory approval in the applicable jurisdiction could be delayed or we may never receive approval at all. Further, regulatory approval in one jurisdiction does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one jurisdiction may have a negative effect on the regulatory processes in others. If linaclotide is not approved for all indications or patient populations or with the label requested, this would limit the uses of linaclotide and have an adverse effect on its commercial potential or require costly post-marketing studies.

We face potential product liability exposure, and, if claims brought against us are successful, we could incur substantial liabilities.

The use of our product candidates in clinical trials and the sale of marketed products expose us to product liability claims. If we do not successfully defend ourselves against product liability claims, we could incur substantial liabilities. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- decreased demand for approved products;
- impairment of our business reputation;
- withdrawal of clinical trial participants;
- initiation of investigations by regulators;
- litigation costs;
- distraction of management's attention from our primary business;
- substantial monetary awards to patients or other claimants;
- loss of revenues; and
- the inability to commercialize our product candidates.

We currently have product liability insurance coverage for the commercial sale of linaclotide and lesinurad and for the clinical trials of our product candidates which is subject to industry-standard terms, conditions and exclusions. Our insurance coverage may not be sufficient to reimburse us for expenses or losses associated with claims. Moreover, insurance coverage is becoming increasingly expensive, and, in the future, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses. On occasion, large judgments have been awarded in lawsuits based on drugs that had unanticipated side effects. A successful product liability claim or series of claims could cause our stock price to decline and, if judgments exceed our insurance coverage, could decrease our cash and adversely affect our business.

We face competition and new products may emerge that provide different or better alternatives for treatment of the conditions that our products are approved to treat.

The pharmaceutical industry and the markets in which we operate are intensely competitive. We compete in the marketing and sale of our products, the development of new products and the acquisition of rights to new products with commercial potential. Certain of our competitors have substantially greater financial, technical and human resources than us. Mergers and acquisitions in the pharmaceutical industry may result in even more resources being concentrated in our competitors. Competition may increase further as a result of advances made in the commercial applicability of technologies and greater availability of capital for investment in these fields. Additionally, new developments, including

the development of other drug technologies and methods of preventing the incidence of disease, occur in the pharmaceutical and medical technology industries at a rapid pace. These developments may render our products obsolete or noncompetitive.

Our products compete with certain prescription therapies and over-the-counter products for the treatment of the indications for which they are approved, or their associated symptoms, and in many cases with products that have attained significant levels of market acceptance. The availability of prescription competitors and over-the-counter products for such conditions could limit the demand, and the price we are able to charge, for our products unless we are able to achieve market acceptance among the medical community and patients and differentiate our products on the basis of their cost and/or actual or perceived benefits. For example, Takeda Pharmaceuticals Limited's AMITIZA (lubiprostone) is approved by the FDA for sale in the U.S. for the treatment of IBS-C, CIC and opioid-induced constipation, Synergy Pharmaceuticals, Inc.'s, or Synergy, TRULANCE (plecanatide) is approved by the FDA for sale in the U.S. for the treatment of adults with IBS-C and CIC, and Shire plc's MOTEGRITY (prucalopride) is approved by the FDA for sale in the U.S. for the treatment of CIC in adults. Additionally, we believe other companies are developing products which could compete with our products, should they be approved by the FDA or foreign regulatory authorities. Currently, there are other compounds in late stage development and other potential competitors are in earlier stages of development for the treatment of the indications for which our products are approved. If our current or potential competitors are successful in completing drug development for their drug candidates and obtain approval from the FDA or foreign regulatory authorities, they could limit the demand for our products.

We will incur significant liability if it is determined that we are promoting any "off-label" uses of our products.

Physicians are permitted to prescribe drug products and medical devices for uses that are not described in the product's labeling and that differ from those approved by the FDA or other applicable regulatory agencies. Such "off-label" uses are common across medical specialties. Although the FDA and other regulatory agencies do not regulate a physician's choice of treatments, the FDA and other regulatory agencies do restrict communications on the subject of off-label use. Companies are not permitted to promote drugs or medical devices for off-label uses. Accordingly, we do not permit promotion of any approved product that we develop, license, commercialize, promote, co-promote or otherwise partner for any indication, population or use not described in such product's label. The FDA and other regulatory and enforcement authorities actively enforce laws and regulations prohibiting promotion of off-label uses and the promotion of products for which marketing approval has not been obtained. A company that is found to have promoted off-label uses will be subject to significant liability, including civil and administrative remedies as well as criminal sanctions. Even if it is later determined that we were not in violation of these laws, we may be faced with negative publicity, incur significant expenses defending our actions and have to divert significant management resources from other matters.

Notwithstanding the regulatory restrictions on off-label promotion, the FDA and other regulatory authorities allow companies to engage in truthful, non-misleading, and non-promotional scientific exchange concerning their products. We intend to engage in medical education activities and communicate with healthcare providers in compliance with all applicable laws, regulatory guidance and industry best practices. Although we believe we have put in place a robust compliance program, which is designed to ensure that all such activities are performed in a legal and compliant manner, we cannot be certain that our program will address all areas of potential exposure and the risks in this area cannot be entirely eliminated.

If we fail to comply with healthcare and other regulations, we could face substantial penalties and our business, operations and financial condition could be adversely affected.

The products that we promote are marketed in the U.S. and/or covered by federal healthcare programs, and, as a result, certain federal and state healthcare laws and regulations pertaining to product promotion and fraud and abuse are applicable to, and may affect, our business. These laws and regulations include:

- federal healthcare program anti-kickback laws, which prohibit, among other things, persons from offering, soliciting, receiving or providing remuneration, directly or indirectly, to induce either the referral of an individual, for an item or service or the purchasing or ordering of a good or service, for which payment may be made under federal healthcare programs such as Medicare and Medicaid;

- federal false claims laws which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, information or claims for payment from Medicare, Medicaid, or other third-party payers that are false or fraudulent, and which may apply to us for reasons including providing coding and billing advice to customers;

- the federal Health Insurance Portability and Accountability Act of 1996, which prohibits executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters and which also imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information;

- the Federal Food, Drug, and Cosmetic Act, which among other things, strictly regulates drug product and medical device marketing, prohibits manufacturers from marketing such products prior to approval or for off-label use and regulates the distribution of samples;

- federal laws, including the Medicaid Drug Rebate Program, that require pharmaceutical manufacturers to report certain calculated product prices to the government or provide certain discounts or rebates to government authorities or private entities, often as a condition of reimbursement under government healthcare programs;

- the so-called "federal sunshine" law, which requires pharmaceutical and medical device companies to monitor and report certain financial interactions with physicians and teaching hospitals (and additional categories of health care practitioners beginning with reports submitted in 2022) to the federal government for re-disclosure to the public; and

- state law equivalents of the above federal laws, such as anti-kickback and false claims laws which may apply to items or services reimbursed by any third-party payer, including commercial insurers, state transparency laws, state laws limiting interactions between pharmaceutical manufacturers and members of the healthcare industry, and state laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by federal laws, thus complicating compliance efforts.

Our global activities are subject to the U.S. Foreign Corrupt Practices Act which prohibits corporations and individuals from paying, offering to pay, or authorizing the payment of anything of value to any foreign government official, government staff member, political party, or political candidate in an attempt to obtain or retain business or to otherwise influence a person working in an official capacity. We are also subject to similar anti-bribery laws in the other countries in which we do business.

In addition, we may be subject to privacy and security laws in the various jurisdictions in which we operate, obtain or store personally identifiable information. The legislative and regulatory landscape for privacy and data protection continues to evolve, and there has been an increasing focus on privacy and data protection issues with the potential to affect our business. For example, the processing of personal data in the European Economic Area, or the EEA, is subject to the General Data Protection Regulation, or the GDPR, which took effect in May 2018. The GDPR increases obligations with respect to clinical trials conducted in the EEA, such as in relation to the provision of fair processing notices, exercising data subject rights and reporting certain data breaches to regulators and affected individuals, as well as how we document our relationships with third parties that process GDPR-covered personal data on our behalf. The GDPR also increases the scrutiny applied to transfers of personal data from the EEA (including from our clinical trial sites in the EEA) to countries that are considered by the European Commission to lack an adequate level of data protection, such as the United States. The compliance obligations imposed by the GDPR have required us to revise our operations. In addition, the GDPR imposes substantial fines and other regulatory penalties for breaches of data protection requirements, and it confers a private right of action on data subjects and their representatives for breaches of data protection requirements.

If our operations are found to be in violation of any of the laws described above or any other laws, rules or regulations that apply to us, we will be subject to penalties, including civil and criminal penalties, damages, fines and the curtailment or restructuring of our operations. Any penalties, damages, fines, curtailment or restructuring of our operations could adversely affect our ability to operate our business and our financial results. Although compliance programs can mitigate the risk of investigation and prosecution for violations of these laws, rules or regulations, we cannot be certain that our program will address all areas of potential exposure and the risks in this area cannot be entirely

eliminated, particularly because the requirements and government interpretations of the requirements in this space are constantly evolving. Any action against us for violation of these laws, rules or regulations, even if we successfully defend against it, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business, as well as damage our business or reputation. Moreover, achieving and sustaining compliance with applicable federal and state privacy, security, fraud and reporting laws may prove costly.

Healthcare reform and other governmental and private payer initiatives may have an adverse effect upon, and could prevent, our products' or product candidates' commercial success.

The U.S. government and individual states have been aggressively pursuing healthcare reform designed to impact delivery of, and/or payment for, healthcare, which include initiatives intended to reduce the cost of healthcare. For example, in March 2010, the U.S. Congress enacted the Patient Protection and Affordable Care Act, as modified by the Health Care and Education Reconciliation Act, or the ACA, which, among other things, expanded healthcare coverage through Medicaid expansion and the implementation of the individual health insurance mandate; included changes to the coverage and reimbursement of drug products under government healthcare programs; imposed an annual fee on manufacturers of branded drugs; and expanded government enforcement authority. We face uncertainties because there have been, and may be additional, federal legislative and administrative efforts to repeal, substantially modify or invalidate some or all of the provisions of the ACA. Such efforts may lead to fewer Americans having more comprehensive health insurance compliant with the ACA, even in the absence of a legislative repeal. For example, tax reform legislation was enacted at the end of 2017 that includes provisions to eliminate the tax penalty for individuals who do not maintain sufficient health insurance coverage beginning in 2019. The ACA has also been subject to judicial challenge. In December 2018, a federal district court judge, in a challenge brought by a number of state attorneys general, found the ACA unconstitutional in its entirety. Pending appeals, which could take some time, the ACA is still operational in all respects. Adoption of new healthcare reform legislation at the federal or state level could affect demand for, or pricing of, our products or product candidates if approved for sale. However, we cannot predict the ultimate content, timing or effect of any healthcare reform legislation or action, or its impact on us, and healthcare reform could increase compliance costs and may adversely affect our future business and financial results.

In addition, other legislative changes have been adopted that could have an adverse effect upon, and could prevent, our products' or product candidates' commercial success. More broadly, the Budget Control Act of 2011, as amended, or the Budget Control Act, includes provisions intended to reduce the federal deficit, including reductions in Medicare payments to providers through 2027. Any significant spending reductions affecting Medicare, Medicaid or other publicly funded or subsidized health programs, or any significant taxes or fees imposed as part of any broader deficit reduction effort or legislative replacement to the Budget Control Act, or otherwise, could have an adverse impact on our anticipated product revenues.

In addition to governmental efforts in the U.S., foreign jurisdictions as well as private health insurers and managed care plans are likely to continue challenging manufacturers' ability to obtain reimbursement, as well as the level of reimbursement, for pharmaceuticals and other healthcare-related products and services. These cost-control initiatives could significantly decrease the available coverage and the price we might establish for our products, which would have an adverse effect on our financial results.

The Food and Drug Administration Amendments Act of 2007 also provides the FDA enhanced post-marketing authority, including the authority to require post-marketing studies and clinical trials, labeling changes based on new safety information, and compliance with risk evaluations and mitigation strategies approved by the FDA. We and Allergan have established a nonclinical and clinical post-marketing plan with the FDA to understand the safety and efficacy of LINZESS in pediatrics and we are in the process of ending the post-marketing clinical study for lesinurad, each of which is discussed above. The FDA's exercise of this authority has resulted (and is expected to continue to result) in increased development-related costs following the commercial launch of our products, and could result in potential restrictions on the sale and/or distribution of our products, even in such products' approved indications and patient populations.

If we are unable to successfully partner with other companies to develop and commercialize our products and/or product candidates, our ability to grow would be impaired and our business would be adversely affected.

As part of our business strategy, we may partner with pharmaceutical, biotechnology or other companies to develop and commercialize our products or product candidates. Although we have entered into such arrangements with

respect to the development and commercialization of linaclotide worldwide, there can be no assurance that we will be able to do so in the future with respect to other products or product candidates or that we will be able to gain the interest of potential partners; establish and maintain development, manufacturing, marketing, sales or distribution relationships on acceptable terms; that such relationships, if established, will be successful or on favorable terms; or that we will gain market acceptance for such products or product candidates. The process of proposing, negotiating and implementing a partnership arrangement is lengthy and complex. If we enter into any partnering arrangements with third parties, any revenues we receive will depend upon the efforts of such third parties. If we are unable to establish successful partnering arrangements, we may not gain access to the financial resources and industry experience necessary to develop, commercialize or successfully market our products or product candidates, may be forced to curtail, delay or stop a development program or one or more of our other development programs, delay commercialization, reduce the scope of our planned sales or marketing activities or undertake development or commercialization activities at our own expense, and therefore may be unable to generate revenue from our products or product candidates or do so to their full potential.

In pursuing our growth strategy, we will incur a variety of costs and may devote resources to potential opportunities that are never completed or for which we never receive the benefit. Our failure to successfully discover, acquire, develop and market additional product candidates or approved products would impair our ability to grow and adversely affect our business.

As part of our growth strategy, we intend to explore further linaclotide development opportunities. We and Allergan are exploring development opportunities to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions. These development efforts may fail or may not increase the revenues that we generate from LINZESS. Furthermore, they may result in adverse events, or perceived adverse events, in certain patient populations that are then attributed to the currently approved patient population, which may result in adverse regulatory action at the FDA or in other countries or harm linaclotide's reputation in the marketplace, each of which could materially harm our revenues from linaclotide.

We are also pursuing various other programs in our pipeline. We may spend several years and make significant investments in developing any current or future internal product candidate, and failure may occur at any point. Our product candidates are in various stages of development and must satisfy rigorous standards of safety and efficacy before they can be approved for sale by the FDA. To satisfy these standards, we must allocate resources among our various development programs and we must engage in costly and lengthy discovery and development efforts, which are subject to unanticipated delays and other significant uncertainties. Despite our efforts, our product candidates may not offer therapeutic or other improvement over existing competitive drugs, be proven safe and effective in clinical trials, or meet applicable regulatory standards. It is possible that none of the product candidates we are developing will be approved for commercial sale, which would impair our ability to grow.

We have ongoing or planned nonclinical and clinical trials for linaclotide and a number of our internal product candidates, and the strength of our company's pipeline will depend in large part on the outcomes of these studies. Many companies in the pharmaceutical industry have suffered significant setbacks in clinical trials even after achieving promising results in earlier nonclinical or clinical trials. The findings from our completed nonclinical studies may not be replicated in later clinical trials, and our clinical trials may not be predictive of the results we may obtain in later-stage clinical trials or of the likelihood of regulatory approval. Results from our clinical trials and findings from our nonclinical studies could lead to abrupt changes in our development activities, including the possible limitation or cessation of development activities associated with a particular product candidate or program. Furthermore, our analysis of data obtained from nonclinical and clinical activities is subject to confirmation and interpretation by the FDA and other applicable regulatory authorities, which could delay, limit or prevent regulatory approval. Satisfaction of FDA or other applicable regulatory requirements is costly, time-consuming, uncertain and subject to unanticipated delays.

In addition, because our internal research capabilities are limited, we may be dependent upon pharmaceutical and biotechnology companies, academic scientists and other researchers to sell or license products or technology to us. The success of this strategy depends partly upon our ability to identify, select, discover and acquire promising pharmaceutical product candidates and products. The process of proposing, negotiating and implementing a license or acquisition of a product candidate or approved product is lengthy and complex. Other companies, including some with substantially greater financial, marketing and sales resources, may compete with us for the license or acquisition of product candidates and approved products. We have limited resources to identify and execute the acquisition or in-licensing of third-party products, businesses and technologies and integrate them into our current infrastructure.

Moreover, we may devote resources to potential acquisitions or in-licensing opportunities that are never completed, or we may fail to realize the anticipated benefits of such efforts. We may not be able to acquire the rights to additional products or product candidates on terms that we find acceptable, or at all.

In addition, such acquisitions may entail numerous operational and financial risks, including:

- exposure to unknown liabilities;
- disruption of our business and diversion of our management's time and attention to develop acquired products, product candidates or technologies;
- incurrence of substantial debt, dilutive issuances of securities or depletion of cash to pay for acquisitions;
- higher than expected acquisition and integration costs;
- difficulty in combining the operations and personnel of any acquired businesses with our operations and personnel;
- increased amortization expenses;
- impairment of relationships with key suppliers or customers of any acquired businesses due to changes in management and ownership; and
- inability to motivate key employees of any acquired businesses.

Furthermore, we may have little or no insight or control over the development and commercialization of any product that we in-license outside the licensed territory. If other licensees do not effectively develop or commercialize any such product outside the licensed territory, our reputation or the reputation of any such product may be impacted. Also, any product candidate that we acquire may require additional development efforts prior to commercial sale, including extensive clinical testing and approval by the FDA and applicable foreign regulatory authorities. All product candidates are prone to risks of failure typical of pharmaceutical product development, including the possibility that a product candidate will not be shown to be sufficiently safe and effective for approval by regulatory authorities.

The planned separation of our business into two independent, publicly traded companies is subject to various risks and uncertainties and may not be completed on the terms or timeline currently contemplated, if at all, and will involve significant time, effort and expense, which could harm our business, results of operations and financial condition.

In May 2018, we announced the intent to separate our soluble guanylate cyclase, or sGC, business from our commercial and GI business, resulting in two independent, publicly traded companies, Ironwood and Cyclerion Therapeutics, Inc., or Cyclerion. Following the separation, Ironwood is expected to focus on accelerating growth of LINZESS, and advance development programs targeting treatments in GI diseases and abdominal pain. Cyclerion is expected to focus on the sGC pipeline development programs for the treatment of serious and orphan diseases.

The separation is expected to be completed in the first half of 2019, subject to the satisfaction of certain conditions. Adverse market conditions, tax considerations or delays or difficulties effecting the planned separation could delay or prevent, or adversely impact the anticipated benefits from, the planned separation. Consummation of the separation also will require final approval from our board of directors. We may not complete the separation on the terms or on the timeline that we announced, or may, for any or no reason and at any time until the planned separation is complete, abandon the separation or modify or change its terms. Any of the foregoing may result in our not achieving the operational, financial, strategic and other benefits we anticipate, and in each case, our business, results of operations and financial condition could be adversely affected.

We have incurred and will continue to incur significant expenses in connection with the planned separation, and such costs and expenses may be greater than we anticipate. In addition, completion of the separation will require a significant amount of management time and effort which may disrupt our business or otherwise divert management's attention from other aspects of our business, including strategic initiatives, discovery, development and

commercialization efforts and relationships with our partners and other third parties. Any of the foregoing could adversely affect our business, results of operations and financial condition.

The planned separation may not achieve some or all of the anticipated benefits.

Even if the separation is completed, the anticipated operational, financial, strategic and other benefits of the separation may not be achieved. The combined value of the common stock of the two publicly-traded companies may not be equal to or greater than what the value of our common stock would have been had the separation not occurred. The combined value of the common stock of the two companies could be lower than anticipated for a variety of reasons, including the failure of either company to operate and compete effectively as an independent company. The common stock price of each company may experience periods of extreme volatility. In addition, the two independent companies will be smaller and less diversified, with a narrower business focus, and may be more vulnerable to changing market conditions. The separation also presents a number of significant risks to our internal processes, including the failure to maintain an adequate control environment due to changes to our infrastructure technology systems and financial reporting processes.

Ironwood continues to assess the U.S. federal income tax consequences of potential structures to separate our business into two independent, publicly traded companies. If the separation is not generally tax-free for U.S. federal income tax purposes, we and our stockholders could be subject to significant tax liabilities.

If not effected on a tax-free basis, the separation could result in both the use of Ironwood's net operating losses and significant tax liability to Ironwood. The separation could also give rise to a taxable dividend and, as such, may result in significant tax liability for Ironwood's stockholders.

Delays in the completion of clinical testing of any of our product candidates could result in increased costs and delay or limit our ability to generate revenues.

Delays in the completion of clinical testing could significantly affect our product development costs. We do not know whether planned clinical trials will be completed on schedule, if at all. The commencement and completion of clinical trials can be delayed for a number of reasons, including delays related to:

- obtaining regulatory approval to commence a clinical trial;
- reaching agreement on acceptable terms with prospective clinical research organizations, or CROs, and trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- manufacturing sufficient quantities of a product candidate for use in clinical trials;
- obtaining institutional review board approval to conduct a clinical trial at a prospective site;
- recruiting and enrolling patients to participate in clinical trials for a variety of reasons, including competition from other clinical trial programs for the treatment of similar conditions; and
- maintaining patients who have initiated a clinical trial but may be prone to withdraw due to side effects from the therapy, lack of efficacy or personal issues, or who are lost to further follow-up.

Clinical trials may also be delayed as a result of ambiguous or negative interim results. In addition, a clinical trial may be suspended or terminated by us, an institutional review board overseeing the clinical trial at a clinical trial site (with respect to that site), the FDA, or other regulatory authorities due to a number of factors, including:

- failure to conduct the clinical trial in accordance with regulatory requirements or the study protocols;
- inspection of the clinical trial operations or trial sites by the FDA or other regulatory authorities resulting in the imposition of a clinical hold;
- unforeseen safety issues; or

- lack of adequate enrollment or funding to continue the clinical trial.

Additionally, changes in regulatory requirements and guidance may occur, and we may need to amend clinical trial protocols to reflect these changes. Each protocol amendment would require institutional review board review and approval, which may adversely impact the costs, timing or successful completion of the associated clinical trials. If we or our partners terminate or experience delays in the completion of any clinical trials, the commercial prospects for our product candidates may be harmed, and our ability to generate product revenues will be delayed. In addition, many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval.

We may not be able to manage our business effectively if we lose any of our current management team or if we are unable to attract and motivate key personnel.

We may not be able to attract or motivate qualified management and scientific, clinical, operations and commercial personnel in the future due to the intense competition for qualified personnel among biotechnology, pharmaceutical and other businesses, particularly in the greater-Boston area. If we are not able to attract and motivate necessary personnel to accomplish our business objectives, we will experience constraints that will significantly impede the achievement of our objectives.

We are highly dependent on the drug discovery, development, regulatory, commercial, financial and other expertise of our management, particularly Peter M. Hecht, Ph.D., our chief executive officer; Mark Mallon, currently our executive senior advisor and expected to become our chief executive officer upon the completion of the planned separation; Gina Consylman, our senior vice president, chief financial officer, and treasurer; Mark G. Currie, Ph.D., our senior vice president, chief scientific officer and president of research and development; Halley E. Gilbert, our senior vice president, chief legal officer, and secretary; William Huyett, our chief operating officer; and Thomas A. McCourt, our senior vice president, marketing and sales and chief commercial officer. We currently anticipate that Dr. Hecht, Dr. Currie and Mr. Huyett will leave their positions at Ironwood to join the management team of Cyclerion upon completion of the separation, along with other key employees in critical functions across our organization. These and other transitions in our senior management team and other key employees, including other changes that occur in connection with the planned separation of Ironwood and Cyclerion, may result in operational disruptions, and our business may be harmed as a result. In addition to the competition for personnel, the Boston area in particular is characterized by a high cost of living. We could have difficulty attracting experienced talent to our company and each of Ironwood and Cyclerion during and following the planned separation and we may be required to expend significant financial resources in our recruitment efforts, which may or may not be successful.

We also have scientific and clinical advisors who assist us in formulating our product development, clinical strategies and our global supply chain plans, as well as sales and marketing advisors who have assisted us in our commercialization strategy and brand plan for our products. These advisors are not our employees and may have commitments to, or consulting or advisory contracts with, other entities that may limit their availability to us, or may have arrangements with other companies to assist in the development and commercialization of products that may compete with ours.

Security breaches and other disruptions to our information technology structure could compromise our information, disrupt our business and expose us to liability, which would cause our business and reputation to suffer.

In the ordinary course of our business, we collect, process and store sensitive data, including intellectual property, our proprietary business information and that of our suppliers and business partners, as well as personally identifiable information of our patients, clinical trial participants and employees. We also rely to a large extent on information technology systems to operate our business, including to deliver our products. We have outsourced elements of our confidential information processing and information technology structure, and as a result, we are managing independent vendor relationships with third parties who may or could have access to our confidential information. Similarly, our business partners and other third-party providers possess certain of our sensitive data. The secure maintenance of this information is critical to our operations and business strategy. Despite our security measures, our large and complex information technology and infrastructure (and those of our partners, vendors and third-party providers) may be vulnerable to attacks by hackers or breached due to employee error, malfeasance or other disruptions. We, our partners, vendors and other third-party providers could be susceptible to third party attacks on our, and their,

information security systems, which attacks are of ever-increasing levels of sophistication and are made by groups and individuals with a wide range of motives and expertise, including organized criminal groups, hacktivists, nation states and others. While we have invested in information technology and security and the protection of confidential information, there can be no assurance that our efforts will prevent service interruptions or security breaches. Any such interruptions or breach would substantially impair our ability to operate our business and would compromise our, and their, networks and the information stored there could be accessed, publicly disclosed, lost or stolen. Any such access, disclosure or other loss of information could result in legal claims or proceedings, liability under laws that protect the privacy of personal information, disrupt our operations, and damage our reputation, any of which could adversely affect our business. While we maintain cyber liability insurance, this insurance may not be sufficient to cover the losses that may result from an interruption or breach of our (or our partners', vendors' and third-party providers') systems.

Our business could be negatively affected as a result of a proxy contest or certain other stockholder actions.

Responding to certain stockholder actions can be costly, disruptive and time-consuming, and could also impact our ability to attract, retain and motivate our employees. For example, a proxy contest for our annual meeting of stockholders relating to stockholder proposals or director nominees would require significant time and could divert the attention of our management, other employees and our board of directors. In addition, a proxy contest would require us to incur significant costs, including legal fees and proxy solicitation expenses.

Our business involves the use of hazardous materials, and we must comply with environmental laws and regulations, which can be expensive and restrict how we do business.

Our activities involve the controlled storage, use and disposal of hazardous materials. We are subject to federal, state, city and local laws and regulations governing the use, manufacture, storage, handling and disposal of these hazardous materials. Although we believe that the safety procedures we use for handling and disposing of these materials comply with the standards prescribed by these laws and regulations, we cannot eliminate the risk of accidental contamination or injury from these materials. In the event of an accident, local, city, state or federal authorities may curtail the use of these materials and interrupt our business operations. We do not currently maintain hazardous materials insurance coverage.

Risks Related to Intellectual Property

Limitations on the patent rights relating to our products and our product candidates may limit our ability to prevent third parties from competing against us.

Our success depends on our ability to obtain and maintain patent protection for our products and product candidates, preserve our trade secrets, prevent third parties from infringing upon our proprietary rights and operate without infringing upon the proprietary rights of others.

The strength of patents in the pharmaceutical industry involves complex legal and scientific questions and can be uncertain. Patent applications in the U.S. and most other countries are confidential for a period of time until they are published, and publication of discoveries in scientific or patent literature typically lags actual discoveries by several months or more. As a result, we cannot be certain that we were the first to conceive inventions covered by our patents and pending patent applications or that we were the first to file patent applications for such inventions. In addition, we cannot be certain that our patent applications will be granted, that any issued patents will adequately protect our intellectual property, or that such patents will not be challenged, narrowed, invalidated or circumvented.

We have several issued patents and pending applications in the U.S. related to LINZESS, including a LINZESS composition of matter and methods of use patent (U.S. Patent 7,304,036) expiring in 2026. Additional U.S. patents and pending applications related to LINZESS include multiple patents relating to our commercial, room temperature stable formulation of linaclotide and methods of using this formulation, the latest of which expire in the early 2030s, as well as other patents and pending patent applications covering processes for making LINZESS, formulations and dosing regimens thereof, and molecules related to LINZESS. Although none of these issued patents currently is subject to a patent reexamination or review, we cannot guarantee that they will not be subject to reexamination or review by the U.S. Patent and Trademark Office, or the USPTO, in the future. We believe in the strength of our linaclotide patent portfolio and that it gives us sufficient freedom to operate; however, if any of our present or future patents is invalidated, this could have an adverse effect on our business and financial results. In March 2013, an opposition to one of our granted

patents covering linaclotide was filed in Europe. In April 2015, the patent was upheld in its entirety by the European Patent Office, affirming the strength of our intellectual property and our belief that the opposition was without merit. The associated appeal was withdrawn by the opponent in January 2019.

Furthermore, the America Invents Act, which was signed into law in 2011, has made several major changes in the U.S. patent statutes. These changes permit third parties to challenge our patents more easily and create uncertainty with respect to the interpretation and practice of U.S. patent law. Moreover, the U.S. Supreme Court has ruled on several patent cases in recent years, narrowing the scope of patent protection available and weakening the rights of patent owners in certain circumstances. Depending on the impact of these decisions and other actions by the U.S. Congress, the federal courts, the USPTO, and their foreign counterparts, the laws and regulations governing patents may change, or their interpretation or implementation may change, in unpredictable ways that could impact, potentially adversely, our ability to obtain new patents or to enforce and defend patents that we have already obtained or that we might obtain in the future. For example, such changes may increase the costs and complexity associated with obtaining, enforcing or defending our patents, including in abbreviated new drug application, or ANDA, litigation.

We also rely upon unpatented trade secrets, unpatented know-how and continuing technological innovation to develop and maintain our competitive position, which we seek to protect, in part, by confidentiality agreements with our employees and our partners and consultants. We also have agreements with our employees and selected consultants that obligate them to assign their inventions to us. It is possible, however, that technology relevant to our business will be independently developed by a person that is not a party to such an agreement. Furthermore, if the employees and consultants that are parties to these agreements breach or violate the terms of these agreements, we may not have adequate remedies, and we could lose our trade secrets through such breaches or violations. Additionally, our trade secrets could otherwise become known or be independently discovered by our competitors.

In addition, the laws of certain foreign countries do not protect proprietary rights to the same extent or in the same manner as the U.S., and, therefore, we may encounter problems in protecting and defending our intellectual property in certain foreign jurisdictions.

If we are sued for infringing intellectual property rights of third parties, it will be costly and time consuming, and an unfavorable outcome in such litigation could have a material adverse effect on our business.

Our commercial success depends on our ability, and the ability of our partners, to develop, manufacture, market and sell our products and use our proprietary technologies without infringing the proprietary rights of third parties. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we and our partners are developing products. As the biotechnology and pharmaceutical industry expands and more patents are issued, the risk increases that our potential products may give rise to claims of infringement of the patent rights of others. There may be issued patents of third parties of which we are currently unaware that may be infringed by linaclotide or our product candidates. Because patent applications can take many years to issue, there may be currently pending applications which may later result in issued patents that linaclotide or our product candidates may infringe.

We may be exposed to, or threatened with, litigation by third parties alleging that linaclotide or our product candidates infringe their intellectual property rights. If linaclotide or one of our product candidates is found to infringe the intellectual property rights of a third party, we or our partners could be enjoined by a court and required to pay damages and could be unable to develop or commercialize linaclotide or the applicable product candidate unless we obtain a license to the intellectual property rights. A license may not be available to us on acceptable terms, if at all. In addition, during litigation, the counter-party could obtain a preliminary injunction or other equitable relief which could prohibit us from making, using or selling our products, pending a trial on the merits, which may not occur for several years.

There is a substantial amount of litigation involving patent and other intellectual property rights in the biotechnology and pharmaceutical industries generally. If a third party claims that we or our partners infringe its intellectual property rights, we may face a number of issues, including, but not limited to:

- infringement and other intellectual property claims which, regardless of merit, may be expensive and time-consuming to litigate and may divert our management's attention from our core business;

- substantial damages for infringement, which we may have to pay if a court decides that the product at issue infringes on or violates the third party's rights, and, if the court finds that the infringement was willful, we could be ordered to pay treble damages and the patent owner's attorneys' fees;

- a court prohibiting us from selling our product unless the third party licenses its rights to us, which it is not required to do;

- if a license is available from a third party, we may have to pay substantial royalties, fees or grant cross-licenses to our intellectual property rights; and

- redesigning our products so they do not infringe, which may not be possible or may require substantial monetary expenditures and time.

We have received notices of Paragraph IV certifications related to linaclotide in conjunction with ANDAs filed by generic drug manufacturers, and we may receive additional notices from others in the future. We have, and may continue to, become involved in legal proceedings to protect or enforce intellectual property rights relating to our products and our product candidates, which could be expensive and time consuming, and unfavorable outcomes in such proceedings could have a material adverse effect on our business.

Competitors may infringe the patents relating to our products and our product candidates or may assert that such patents are invalid. To counter ongoing or potential infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. Litigation with generic manufacturers has become increasingly common in the biotechnology and pharmaceutical industries. In addition, in an infringement or invalidity proceeding, a court or patent administrative body may determine that a patent of ours is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. Generic drug manufacturers were first able to file ANDAs for generic versions of LINZESS in August 2016, but we may not become aware of these filings for several months after any such submission due to procedures specified under applicable FDA regulations. When filing an ANDA for one of our products, a generic drug manufacturer may choose to challenge one or more of the patents that cover such product. As such, we have brought, and may bring in the future, legal proceedings against generic drug manufacturers.

We and Allergan have received Paragraph IV certification notice letters, or Notice Letters, regarding ANDAs submitted to the FDA by generic drug manufacturers requesting approval to engage in commercial manufacture, use, sale and offer for sale of linaclotide capsules (72 mcg, 145 mcg and 290 mcg), proposed generic versions of our FDA-approved drug LINZESS. For additional information relating to such ANDAs, see Item 3, Legal Proceedings, elsewhere in this Annual Report on Form 10-K. Frequently, innovators receive multiple ANDA filings. Consequently, we expect to receive additional notice letters regarding ANDAs submitted to the FDA, and may receive amendments to the Notice Letters.

After evaluation, we have in the past filed, and may, in the future, file, patent infringement lawsuits or take other action against companies making ANDA filings. If a patent infringement suit has been filed within 45 days of receipt of a notice letter, the FDA is not permitted to approve any ANDA that is the subject of such lawsuit for 30 months from the date of the NDA holder's and patent owner's receipt of the ANDA filer's notice letter, or until a court decides that the relevant patents are invalid, unenforceable and/or not infringed. In the case of suits filed before expiration of the new chemical entity, or NCE, exclusivity period for a particular drug, the 30-month stay would be calculated from the end of the applicable NCE exclusivity period. In addition to shortening the 30-month stay based on a decision that the relevant patents are invalid, unenforceable and/or not infringed, a court can also shorten or lengthen the 30-month stay under certain limited circumstances. The NCE exclusivity period for LINZESS expired on August 30, 2017, and the 30-month stay for each ANDA that is the subject of the current patent infringement lawsuits filed by us before such expiration date ends on February 29, 2020 (absent any of the foregoing adjustments). We have filed patent infringement lawsuits against the companies making such ANDA filings, and we have entered into settlement agreements with three such companies. For additional information relating to such lawsuits and settlements, see Item 3, Legal Proceedings, elsewhere in this Annual Report on Form 10-K.

Additionally, the validity of the patents relating to our products and our product candidates may be challenged by third parties pursuant to administrative procedures introduced by the America Invents Act, specifically *inter partes*

review, or IPR, and/or post grant review, or PGR, before the USPTO. Generic drug manufacturers may challenge our patents through IPRs or PGRs instead of or in addition to ANDA legal proceedings.

Patent litigation (including any lawsuits that we file against generic drug manufacturers in connection with the receipt of a notice letter), IPRs and PGRs involve complex legal and factual questions and we may need to devote significant resources to such legal proceedings. We can provide no assurance concerning the duration or the outcome of any such patent-related lawsuits or administrative proceedings, including any settlements or other resolutions thereof which could, in addition to other risks, result in a shortening of exclusivity periods. An adverse result in any litigation or defense proceedings could put one or more of the patents relating to our products and our product candidates at risk of being invalidated or interpreted narrowly, or could otherwise result in a loss of patent protection for the product or product candidate at issue, and could put our patent applications at risk of not issuing, which would materially harm our business. Upon any loss of patent protection for one of our products, or upon an "at-risk" launch (despite pending patent infringement litigation, before any court decision or while an appeal of a lower court decision is pending) by a manufacturer of a generic version of one of our patented products, our revenues for that product could be significantly reduced in a short period of time, which would materially and adversely affect our business.

Interference or derivation proceedings brought by the USPTO may be necessary to determine the priority of inventions with respect to the patents relating to our products and our product candidates and patent applications or those of our partners. An unfavorable outcome could require us to cease using the technology or to attempt to license rights to it from the prevailing party. Our business could be harmed if a prevailing party does not offer us a license on terms that are acceptable to us. Litigation or interference proceedings may fail and, even if successful, may result in substantial costs and distraction of our management and other employees. In addition, we may not be able to prevent, alone or with our partners, misappropriation of our proprietary rights, particularly in countries where the laws may not protect those rights as fully as in the U.S.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, as well as the potential for public announcements of the results of hearings, motions or other interim proceeding or developments, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation.

Risks Related to Our Finances and Capital Requirements

We have incurred significant losses since our inception and cannot guarantee when, if ever, we will become profitable or attain positive cash flows.

In recent years, we have focused primarily on developing, manufacturing and commercializing our products, as well as developing our other product candidates. We have financed our business to date primarily through the issuance of equity, our collaboration and license arrangements, our January 2013 issuance of our 11% PhaRMA Notes due 2024, or the PhaRMA Notes, related to the sales of LINZESS in the U.S. (which were redeemed, in full, in connection with the funding and issuance in January 2017 of our 8.375% Notes due 2026, or the 2026 Notes) and our June 2015 issuance of our 2.25% Convertible Senior Notes due June 15, 2022, or the 2022 Notes, and we have incurred losses in each year since our inception in 1998. We currently derive a significant portion of our revenue from our LINZESS collaboration with Allergan for the U.S. We believe that the revenues from the LINZESS collaboration will continue to constitute a significant portion of our total revenue for the foreseeable future. We incurred net losses of approximately $282.4 million, approximately $116.9 million and approximately $81.7 million in the years ended December 31, 2018, 2017 and 2016, respectively. As of December 31, 2018, we had an accumulated deficit of approximately $1.6 billion. We cannot be certain that sales of our products, and the revenue from our other commercial activities will not fall short of our projections or be delayed. Further, we expect to continue to incur substantial expenses in connection with our efforts to commercialize linaclotide and research and develop our product candidates. Because of the numerous risks and uncertainties associated with developing and commercializing pharmaceutical products, as well as those related to our expectations for our products and our other activities, we are unable to predict the extent of any future losses or guarantee when, or if, our company will become profitable or cash flow positive. If we never achieve profitability or positive cash flows, or achieve either later than we anticipate, this will have an adverse effect on our stockholders' equity and working capital.

We may need additional funding and may be unable to raise capital when needed, which could cause us to delay, reduce or eliminate our product development programs or commercialization efforts.

In January 2017, in connection with the redemption of our PhaRMA Notes, we issued $150.0 million aggregate principal amount of our 2026 Notes bearing an annual interest rate of 8.375%. In June 2015, we issued approximately $335.7 million aggregate principal amount of our 2022 Notes and we have previously raised additional funds through other capital raising activities, including the sale of shares of our common stock in public offerings and the issuance of our PhaRMA Notes in January 2013 (which were redeemed, in full, in connection with the issuance of our 2026 Notes). However, marketing and selling primary care drugs, purchasing commercial quantities of pharmaceutical products, developing product candidates, conducting clinical trials and accessing externally developed products are expensive and uncertain. Circumstances, our strategic imperatives, or opportunities to create or acquire new programs, as well as maturities, redemptions or repurchases of our outstanding debt securities, could require us to, or we may choose to, seek to raise additional funds. The amount and timing of our future funding requirements will depend on many factors, including, but not limited to:

- the level of underlying demand for our products by prescribers and patients in the countries in which they are approved;
- the costs associated with commercializing our products in the U.S.;
- the costs of establishing, maintaining and/or expanding sales, marketing, distribution, and market access capabilities for our products;
- the regulatory approval of linaclotide outside of the U.S. and the other countries where it is approved and the timing of commercial launches in those countries, and the regulatory approval of linaclotide within new indications, populations and formulations, as well as the associated development and commercial milestones and royalties;
- the rate of progress, the cost of our clinical trials and the other costs associated with our linaclotide product development programs, including our post-approval nonclinical and clinical studies of linaclotide in pediatrics and our investment to enhance the clinical profile of LINZESS within IBS-C and CIC, as well as to study linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions;
- the costs and timing of in-licensing additional products or product candidates or acquiring other complementary companies or assets;
- the achievement and timing of milestone payments and royalties due or payable under our collaboration and license agreements;
- the status, terms and timing of any collaboration, licensing, co-commercialization or other arrangements;
- the timing of any regulatory approvals of our product candidates;
- whether the holders of our 2022 Notes hold the notes to maturity without conversion into our common stock and whether we are required to repurchase our 2022 Notes prior to maturity upon a fundamental change, as defined in the indenture governing the 2022 Notes;
- whether we seek to redeem or repurchase all or part of our outstanding debt through cash purchases and/or exchanges, in open market purchases, privately negotiated transactions, by tender offer or otherwise; and
- any delays or difficulties effecting the planned separation.

Additional funding may not be available on acceptable terms or at all. If adequate funds are not available, we may be required to delay or reduce the scope of our commercialization efforts, delay, reduce or eliminate one or more of our development programs or delay or abandon potential strategic opportunities.

Our ability to pay principal of and interest on our outstanding debt securities will depend in part on the receipt of payments from Allergan under our collaboration agreement for North America.

In January 2017, we issued, in connection with the redemption of our PhaRMA Notes, $150.0 million aggregate principal amount of our 2026 Notes bearing an annual interest rate of 8.375% and in June 2015, we issued approximately $335.7 million aggregate principal amount of our 2022 Notes bearing an annual interest rate of 2.25%. Semi-annual payments on our 2022 Notes commenced on December 15, 2015. Quarterly interest payments on our 2026 Notes commenced on June 15, 2017 and, pursuant to the associated indenture, beginning in March 2019 we are obligated to make quarterly payments on our 2026 Notes equal to the greater of (i) 7.5% of net sales of linaclotide in the U.S. for the preceding quarter and (ii) the accrued and unpaid interest on the 2026 Notes. Principal on the 2026 Notes is to be repaid in an amount equal to the difference between (i) and (ii) above, when this is a positive number, until the principal has been paid in full. We expect that for the next few years, at a minimum, the net quarterly payments from Allergan will be a significant source of cash flow from operations. If the cash flows derived from the net quarterly payments that we receive from Allergan under the collaboration agreement for North America are insufficient on any particular payment date to fund the interest payment on our outstanding indebtedness, at a minimum, we will be obligated to pay the amounts of such shortfall out of our general funds. The determination of whether Allergan will be obligated to make a net quarterly payment to us in respect of a particular quarterly period is a function of the revenue generated by LINZESS in the U.S. as well as the development, manufacturing and commercialization expenses incurred by each of us and Allergan under the collaboration agreement for North America. Accordingly, since we cannot guarantee when, or if, our company will become profitable or cash flow positive, we cannot provide assurances that (i) we will have the available funds to fund the interest payment on our outstanding indebtedness, at a minimum, in the event that there is a deficiency in the net quarterly payment received from Allergan, (ii) there will be a net quarterly payment from Allergan at all or (iii) we will not also be required to make a true-up payment to Allergan under the collaboration agreement for North America, in each case, in respect of a particular quarterly period.

Our indebtedness could adversely affect our financial condition or restrict our future operations.

As of December 31, 2018, we had total indebtedness of approximately $485.7 million and available cash and cash equivalents of approximately $173.2 million. We chose to issue our 2026 Notes (in connection with the redemption, in full, of our PhaRMA Notes) and our 2022 Notes based on the additional strategic optionality that they create for us, and the limited restrictions that these debt securities place on our ability to run our business compared to other potential available financing transactions. However, our indebtedness, combined with our other financial obligations and contractual commitments, could have other important consequences on our business, including:

- limiting our ability to obtain additional financing to fund future working capital, capital expenditures or other general corporate purposes, including product development, commercialization efforts, research and development activities, strategic arrangements, acquisitions and refinancing of our outstanding debt;
- requiring a substantial portion of our cash flow to be dedicated to debt service payments instead of other purposes, thereby reducing the amount of cash flow available for working capital, capital expenditures, corporate transactions and other general corporate purposes;
- increasing our vulnerability to adverse changes in general economic, industry and competitive conditions;
- limiting our flexibility in planning for and reacting to changes in the industry in which we compete;
- placing us at a disadvantage compared to other, less leveraged competitors or competitors with comparable debt at more favorable interest rates; and
- increasing our cost of borrowing.

If we do not generate sufficient cash flow from operations or if future borrowings are not available to us in an amount sufficient to pay our indebtedness, including payments of principal when due on our outstanding indebtedness or, in the case of our 2022 Notes, in connection with a transaction involving us that constitutes a fundamental change under the indenture governing the 2022 Notes, or to fund our liquidity needs, we may be forced to refinance all or a portion of our indebtedness on or before the maturity dates thereof, sell assets, reduce or delay currently planned activities or curtail operations, seek to raise additional capital or take other actions. We may not be able to execute any of

these actions on commercially reasonable terms or at all. This, together with any of the factors described above, could materially and adversely affect our business, financial condition and results of operations.

In addition, while our 2022 Notes do not include covenants restricting the operation of our business except in certain limited circumstances, in the event of a default under the 2022 Notes, the noteholders or the trustee under the indenture governing the 2022 Notes may accelerate our payment obligations under the 2022 Notes, which could have a material adverse effect on our business, financial condition and results of operations. We are also required to offer to repurchase the 2022 Notes upon the occurrence of a fundamental change, which could include, among other things, any acquisition of our company (other than an acquisition in which at least 90% of the consideration is common stock listed on The NASDAQ Global or Global Select Market or The New York Stock Exchange), subject to the terms of the 2022 Notes indenture. The repurchase price must be paid in cash, and this obligation may have the effect of discouraging, delaying or preventing an acquisition of our company that would otherwise be beneficial to our security holders.

Further, although we are not as restricted under our 2026 Notes as we might have been under a more traditional secured credit facility provided by a bank, the indenture governing our 2026 Notes contains a number of restrictive covenants that impose restrictions on us and may limit our ability to engage in certain acts, including restrictions on our ability to:

- amend our collaboration agreement with Allergan for North America in a way that would have a material adverse effect on the noteholders' rights, or terminate this collaboration agreement with respect to the U.S.;
- transfer our rights to commercialize the product under our collaboration agreement with Allergan for North America; and
- incur certain liens.

Upon a breach of the covenants under our 2026 Notes indenture, or if certain other defaults thereunder occur, the holders of our 2026 Notes could elect to declare all amounts outstanding under our 2026 Notes to be immediately due and payable and we cannot be certain that we will have sufficient assets to repay them. If we are unable to repay those amounts, the holders of our 2026 Notes could proceed against the collateral granted to them to secure the debt securities and we could be forced into bankruptcy or liquidation. If we breach our covenants under our 2026 Notes indenture and seek a waiver, we may not be able to obtain a waiver from the required noteholders. If this occurs, we would be in default under our 2026 Notes indenture and the holders of our 2026 Notes could exercise their rights, as described above.

Each of our 2026 Notes and 2022 Notes also include cross-default features providing that a default under the indenture governing either the 2026 Notes or the 2022 Notes would likely result in a default under the indenture governing the other indebtedness. In the event of such default, the trustee or noteholders could elect to declare all amounts outstanding to be immediately due and payable under the applicable indenture, which could have a material adverse effect on our business, financial condition and results of operations.

Convertible note hedge and warrant transactions entered into in connection with our 2022 Notes may affect the value of our common stock.

In connection with our 2022 Notes, we entered into Convertible Note Hedges and separate Note Hedge Warrant transactions with certain financial institutions. These transactions are expected generally to reduce the potential dilution upon any conversion of our 2022 Notes or offset any cash payments we are required to make in excess of the principal amount of converted 2022 Notes, as the case may be.

In connection with these transactions, the financial institutions purchased our common stock in secondary market transactions and entered into various over-the-counter derivative transactions with respect to our common stock. These entities or their affiliates are likely to modify their hedge positions from time to time prior to conversion or maturity of the 2022 Notes by purchasing and selling shares of our common stock or other instruments they may wish to use in connection with such hedging. Any of these activities could adversely affect the value of our common stock and, as a result, the number of shares and the value of the common stock noteholders will receive upon conversion of the 2022 Notes. In addition, under certain circumstances the counterparties have the right to terminate the Convertible Note Hedges and settle the Note Hedge Warrants at fair value (as defined in the applicable confirmations), which may result

in us not receiving all or any portion of the anticipated benefit of the Convertible Note Hedges. If the price of our common stock increases such that the hedge transactions settle in our favor, we could also be exposed to credit risk related to the counterparties to the Convertible Note Hedges, which would limit or eliminate the benefit of such transactions to us.

Our quarterly and annual operating results may fluctuate significantly.

We expect our operating results to be subject to frequent fluctuations. Our net loss and other operating results will be affected by numerous factors, including:

- the level of underlying demand for our products in the countries in which they are approved;
- wholesalers' buying patterns with respect to our products;
- the costs associated with commercializing our products in the U.S.;
- the achievement and timing of milestone payments and royalties due or payable under our collaboration and license agreements;
- our execution of any collaboration, partnership, licensing or other strategic arrangements, and the timing of payments we may make or receive under these arrangements;
- any excess or obsolete inventory or impairments of assets or goodwill, and associated write-downs;
- any changes in the fair value of contingent consideration and the associated impact on our statement of operations;
- any variations in the level of expenses related to our development programs;
- addition or termination of clinical trials;
- regulatory developments affecting our products and product candidates; and
- any material lawsuit in which we may become involved.

If our operating results fall below the expectations of investors or securities analysts for any of the foregoing reasons or otherwise, the price of our common stock could decline substantially. Furthermore, any quarterly or annual fluctuations in our operating results may, in turn, cause the price of our stock to fluctuate substantially.

Our ability to use net operating loss and tax credit carryforwards and certain built-in losses to reduce future tax payments is limited by provisions of the Internal Revenue Code, and it is possible that our net operating loss and tax credit carryforwards may expire before we generate sufficient taxable income to use such carryforwards, or that certain transactions or a combination of certain transactions may result in material additional limitations on our ability to use our net operating loss and tax credit carryforwards.

We have incurred significant net losses since our inception and cannot guarantee when, if ever, we will become profitable. To the extent that we continue to generate federal and state taxable losses, unused net operating loss and tax credit carryforwards will carry forward to offset future taxable income, if any, until the date, if any, on which such unused carryforwards expire. Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, contain rules that limit the ability of a company that undergoes an ownership change, which is generally any change in ownership of more than 50% of its stock over a three-year period, to utilize its net operating loss and tax credit carryforwards and certain built-in losses recognized in years after the ownership change. These rules generally operate by focusing on ownership changes involving stockholders owning directly or indirectly 5% or more of the stock of a company and any change in ownership arising from a new issuance of stock by the company. Generally, if an ownership change occurs, the yearly taxable income limitation on the use of net operating loss and tax credit carryforwards and certain built-in losses is equal to the product of the applicable long term tax exempt rate and the value of the company's stock immediately before the ownership change.

If we do not generate sufficient taxable income prior to the expiration, if any, of the applicable carryforwards or if the carryforwards are subject to the limitations described above, we may be unable to offset our taxable income with losses, or our tax liability with credits, before such losses and credits expire and therefore would incur larger federal or state income tax liability. We have completed several financings since our inception which may have resulted in a change in control as defined by Section 382, or could result in a change in control in the future.

Risks Relating to Securities Markets and Investment in Our Stock

Anti-takeover provisions under our charter documents and Delaware law could delay or prevent a change of control which could negatively impact the market price of our common stock.

Provisions in our certificate of incorporation and bylaws may have the effect of delaying or preventing a change of control. These provisions include the following:

- Our board of directors is divided into three classes serving staggered three-year terms, such that not all members of the board are elected at one time. This staggered board structure prevents stockholders from replacing the entire board at a single stockholders' meeting.

- Our board of directors has the right to elect directors to fill a vacancy created by the expansion of the board of directors or the resignation, death or removal of a director, which prevents stockholders from being able to fill vacancies on our board of directors.

- Our board of directors may issue, without stockholder approval, shares of preferred stock. The ability to authorize preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to acquire us.

- Stockholders must provide advance notice to nominate individuals for election to the board of directors or to propose matters that can be acted upon at a stockholders' meeting. Furthermore, stockholders may only remove a member of our board of directors for cause. These provisions may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect such acquirer's own slate of directors or otherwise attempting to obtain control of our company.

- Our stockholders may not act by written consent. As a result, a holder, or holders, controlling a majority of our capital stock are not able to take certain actions outside of a stockholders' meeting.

- Special meetings of stockholders may be called only by the chairman of our board of directors, our chief executive officer or a majority of our board of directors. As a result, a holder, or holders, controlling a majority of our capital stock are not able to call a special meeting.

- A super-majority (80%) of the outstanding shares of common stock are required to amend our bylaws, which make it more difficult to change the provisions described above.

In addition, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which may prohibit certain business combinations with stockholders owning 15% or more of our outstanding voting stock. These and other provisions in our certificate of incorporation and our bylaws and in the Delaware General Corporation Law could make it more difficult for stockholders or potential acquirers to obtain control of our board of directors or initiate actions that are opposed by the then-current board of directors.

If we identify a material weakness in our internal control over financial reporting, it could have an adverse effect on our business and financial results and our ability to meet our reporting obligations could be negatively affected, each of which could negatively affect the trading price of our common stock.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis. Accordingly, a material weakness increases the risk that the financial information we report contains material errors.

We regularly review and update our internal controls, disclosure controls and procedures, and corporate governance policies. In addition, we are required under the Sarbanes-Oxley Act of 2002 to report annually on our internal control over financial reporting. Our system of internal controls, however well-designed and operated, is based in part on certain assumptions and includes elements that rely on information from third parties, including our partners. Our system can provide only reasonable, not absolute, assurances that the objectives of the system are met. If we, or our independent registered public accounting firm, determine that our internal controls over financial reporting are not effective, or we discover areas that need improvement in the future, these shortcomings could have an adverse effect on our business and financial results, and the price of our common stock could be negatively affected.

Further, we are dependent on our partners for information related to our results of operations. Our net profit or net loss generated from the sales of LINZESS in the U.S. is partially determined based on amounts provided by Allergan and involves the use of estimates and judgments, which could be modified in the future. We are highly dependent on our linaclotide partners for timely and accurate information regarding any revenues realized from sales of linaclotide in their respective territories, and in the case of Allergan for the U.S. and AstraZeneca for China, Hong Kong and Macau, the costs incurred in developing and commercializing it in order to accurately report our results of operations. Our results of operations are also dependent on the timeliness and accuracy of information from any other licensing, collaboration or other partners we may have, as well as our and our partners' use of estimates and judgments. If we do not receive timely and accurate information or if estimated activity levels associated with the relevant collaboration or partnership at a given point in time are incorrect, whether the result of a material weakness or not, we could be required to record adjustments in future periods. Such adjustments, if significant, could have an adverse effect on our financial results, which could lead to a decline in our common stock price.

If we cannot conclude that we have effective internal control over our financial reporting, or if our independent registered public accounting firm is unable to provide an unqualified opinion regarding the effectiveness of our internal control over financial reporting, investors could lose confidence in the reliability of our financial statements, which could lead to a decline in our stock price. Failure to comply with reporting requirements could also subject us to sanctions and/or investigations by the SEC, The NASDAQ Stock Market or other regulatory authorities.

We expect that the price of our common stock will fluctuate substantially.

The market price of our common stock may be highly volatile due to many factors, including:

- the commercial performance of our products in the countries in which they are approved, as well as the costs associated with such activities;
- any third-party coverage and reimbursement policies for our products;
- market conditions in the pharmaceutical and biotechnology sectors;
- developments, litigation or public concern about the safety of our products or our potential products;
- announcements of the introduction of new products by us or our competitors;
- announcements concerning product development results, including clinical trial results, or intellectual property rights of us or others;
- actual and anticipated fluctuations in our quarterly and annual operating results;
- deviations in our operating results from any guidance we may provide or the estimates of securities analysts;
- sales of additional shares of our common stock or sales of securities convertible into common stock or the perception that these sales might occur;
- additions or departures of key personnel;

- developments concerning current or future collaboration, partnership, licensing or other strategic arrangements, or with respect to the planned separation; and

- discussion of us or our stock price in the financial or scientific press or in online investor communities.

The realization of any of the risks described in these "Risk Factors" could have a dramatic and material adverse impact on the market price of our common stock. In addition, class action litigation has often been instituted against companies whose securities have experienced periods of volatility. Any such litigation brought against us could result in substantial costs and a diversion of management attention, which could hurt our business, operating results and financial condition.

Item 1B. ***Unresolved Staff Comments***

None.

Item 2. ***Properties***

Our corporate headquarters and operations are located in Cambridge, Massachusetts, where, as of December 31, 2018, we occupied approximately 223,000 square feet of office and laboratory space under our lease expiring in January 2025. We believe that our facilities are suitable and adequate for our needs for the foreseeable future.

Item 3. ***Legal Proceedings***

Actions in which we are the Plaintiff

LINZESS

We and Allergan have received Paragraph IV certification notice letters, or Notice Letters, regarding Abbreviated New Drug Applications, or ANDAs, submitted to the FDA by generic drug manufacturers requesting approval to engage in commercial manufacture, use, sale and offer for sale of (i) 145 mcg and 290 mcg linaclotide capsules, or the Potential Generic Products, and/or (ii) 72 mcg linaclotide capsules, or the Potential 72mcg Generic Products, each proposed generic versions of our FDA-approved drug LINZESS.

In October 2016, we received a Notice Letter relating to an ANDA that was submitted to the FDA by Teva Pharmaceuticals USA, Inc., or Teva. Teva's Notice Letter contends that United States patents for LINZESS (U.S. Patent Nos. 7,371,727, 7,704,947, 7,745,409, 8,080,526, and 8,110,553 (expiring 2024); 7,304,036 (expiring 2026); and 8,748,573, 8,802,628, and 8,933,030 (expiring 2031), or the Challenged Patents) listed in the FDA's list of Approved Drug Products with Therapeutic Equivalence Evaluations, commonly referred to as the Orange Book, are invalid, unenforceable and/or would not be infringed by Teva's manufacture, use, sale or offer for sale of the Potential Generic Products. In September 2017, we received a second Notice Letter relating to the ANDA submitted to the FDA by Teva contending that U.S. Patent No. 9,708,371 (expiring 2033) listed in the Orange Book is invalid and/or would not be infringed by Teva's manufacture, use, sale or offer for sale of the Potential Generic Products. In December 2017, we received a Notice Letter relating to an ANDA that was submitted to the FDA by Teva, contending that U.S. Patent Nos. 7,371,727, 7,704,947, 7,745,409, 8,080,526, and 8,110,553; 7,304,036; 8,933,030; and 9,708,371, or the 72mcg Challenged Patents, are invalid, unenforceable and/or would not be infringed by Teva's manufacture, use, sale or offer for sale of the Potential 72 mcg Generic Product.

In November 2016, we received a Notice Letter relating to an ANDA that was submitted to the FDA by Sandoz Inc., or Sandoz, contending that all of the Challenged Patents are invalid, unenforceable and/or would not be infringed by Sandoz's manufacture, use, sale or offer for sale of the Potential Generic Products. In January 2018, we received a second Notice Letter relating to the ANDA submitted to the FDA by Sandoz contending that U.S. Patent No. 9,708,371 is invalid and/or would not be infringed by Sandoz's manufacture, use, sale or offer for sale of the Potential Generic Products.

In November 2016, we received a Notice Letter relating to an ANDA that was submitted to the FDA by Mylan Pharmaceuticals Inc., or Mylan, contending that all of the Challenged Patents are invalid, unenforceable and/or would not be infringed by Mylan's manufacture, use, sale or offer for sale of the Potential Generic Products. In October 2017,

we received a second Notice Letter relating to the ANDA submitted to the FDA by Mylan contending that U.S. Patent No. 9,708,371 is invalid and/or would not be infringed by Mylan's manufacture, use, sale or offer for sale of the Potential Generic Products. In February 2018, we received a Notice Letter relating to an ANDA that was submitted to the FDA by Mylan, contending that the 72mcg Challenged Patents, are invalid, unenforceable and/or would not be infringed by Mylan's manufacture, use, sale or offer for sale of the Potential 72 mcg Generic Product.

In response to the ANDAs for which we received Notice Letters in 2016, we and Allergan filed a lawsuit against the generic drug manufacturers in Delaware District Court in November 2016. We asserted that the Challenged Patents are valid and infringed by Teva, Sandoz and Mylan. In accordance with the Hatch-Waxman Act, the timely filing of the lawsuits against the ANDA filers with respect to the Challenged Patents triggered an automatic stay of the FDA's approval of the ANDAs until February 29, 2020 (unless there is a final court decision adverse to us and Allergan sooner). In October 2017, November 2017, and January 2018, we and Allergan filed lawsuits against Teva, Mylan, and Sandoz, respectively, each in Delaware District Court, related to each of their respective second Notice Letters. We asserted that U.S. Patent No. 9,708,371 is valid and infringed by each of Teva, Mylan and Sandoz. The lawsuits filed in October 2017, November 2017, and January 2018 against Teva, Mylan and Sandoz, respectively, have been consolidated with the lawsuit filed in November 2016.

Mylan responded to our lawsuit in December 2016, asserting defenses of, among other things, lack of subject matter and personal jurisdiction and improper venue. In January 2017, each of Teva and Sandoz filed an answer and counterclaims seeking declaratory judgment of invalidity and non-infringement of the Challenged Patents. On July 13, 2017, Mylan filed a motion to dismiss for improper venue. In November 2017, Teva filed an answer and counterclaims seeking declaratory judgment of invalidity and non-infringement of U.S. Patent No. 9,708,371. In December 2017, Mylan filed an answer to the lawsuit that we and Allergan filed in November 2017. In February 2018, Sandoz filed an answer and counterclaims seeking declaratory judgment of invalidity and non-infringement of U.S. Patent No. 9,708,371. In February 2018 and March 2018, we and Allergan filed lawsuits against Teva and Mylan, respectively, each in Delaware District Court asserting that the 72mcg Challenged Patents are valid and infringed by Teva and Mylan. In August 2018, we and Allergan filed an amended complaint against Mylan asserting that U.S. Patent No. 8,802,628 is valid and infringed by Mylan's manufacture, use, sale or offer for sale of the Potential 72 mcg Generic Product. These lawsuits were consolidated with the lawsuit filed in November 2016.

In May 2018 and August 2018, we, Allergan, Teva and Sandoz stipulated to dismiss without prejudice all claims, counterclaims and defenses with respect to U.S. Patent Nos. 9,708,371 and 8,933,030, respectively. In August 2018, we, Allergan and Mylan stipulated to dismiss without prejudice all claims, counterclaims and defenses with respect to U.S. Patent Nos. 8,933,030 and 9,708,371.

In December 2018, we, Allergan and Mylan stipulated to transfer Mylan's case to the Northern District of West Virginia. Subsequently, we and Allergan entered into a settlement agreement with Mylan, which is believed to be a first applicant with respect to certain dosage strengths (145 mcg and 290 mcg). Pursuant to the terms of the settlement, we and Allergan will grant Mylan a license to market a generic version of LINZESS 145 mcg and 290 mcg in the United States beginning on February 5, 2030, and a generic version of LINZESS 72 mcg in the United States beginning on August 5, 2030 (both subject to FDA approval), unless certain limited circumstances, customary for settlement agreements of this nature, occur. As a result of the settlement, all Hatch-Waxman litigation between us, Allergan and Mylan regarding LINZESS patents, including Mylan's motion to dismiss for improper venue, has been dismissed.

We and Allergan previously entered into settlement agreements with Sun Pharma Global FZE and Aurobindo Pharma Ltd. and an affiliate of Aurobindo.

Trial is scheduled in June 2019 for the action involving Teva and Sandoz.

Item 4. ***Mine Safety Disclosures***

Not applicable.

PART II

Item 5. ***Market for Registrant's Common Equit y, Related Stockholder Matters and Issuer Purchases of Equity Securities***

Shares of our Class A common stock are traded on the Nasdaq Global Select Market under the symbol "IRWD." Our shares have been publicly traded since February 3, 2010. The following table furnishes the high and low sales prices for our Class A common stock as reported by The Nasdaq Global Select Market for each quarter in the years ended December 31, 2018 and 2017:

	Class A Common Stock			
	2018		2017	
	High	Low	High	Low
First Quarter	$16.64	$12.89	$18.53	$13.43
Second Quarter	$19.46	$13.83	$19.94	$14.93
Third Quarter	$21.20	$16.65	$19.79	$14.16
Fourth Quarter	$19.36	$ 9.07	$17.67	$14.14

As of February 12, 2019, there were 92 stockholders of record of our Class A common stock. The number of record holders is based upon the actual number of holders registered on the books of the company at such date and does not include holders of shares in "street names" or persons, partnerships, associations, corporations or other entities identified in security position listings maintained by depositories.

Subject to preferences that may apply to any shares of preferred stock outstanding at the time, the holders of Class A common stock are entitled to share equally in any dividends that our board of directors may determine to issue from time to time. In the event a dividend is paid in the form of shares of common stock or rights to acquire shares of common stock, the holders of Class A common stock will receive Class A common stock, or rights to acquire Class A common stock, as the case may be.

We have never declared or paid any cash dividends on our capital stock, and we do not currently anticipate declaring or paying cash dividends on our capital stock in the foreseeable future. We currently intend to retain all of our future earnings, if any, to finance operations. Any future determination relating to our dividend policy will be made at the discretion of our board of directors and will depend on a number of factors, including future earnings, capital requirements, financial conditions, future prospects, contractual restrictions and covenants and other factors that our board of directors may deem relevant.

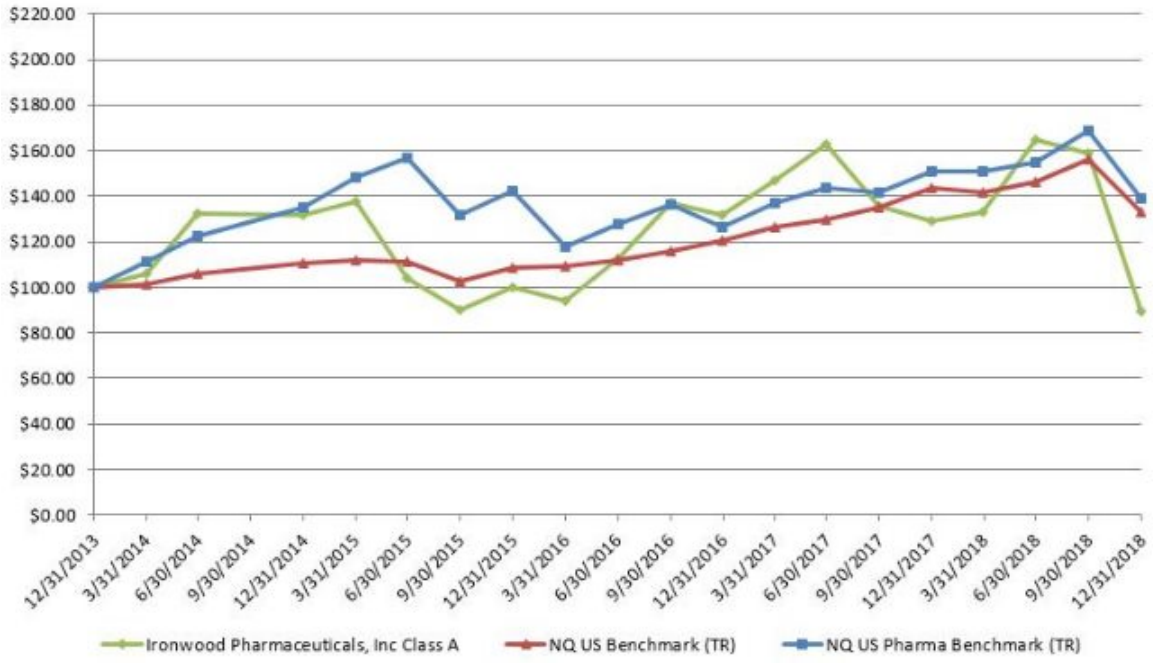
The information required to be disclosed by Item 201(d) of Regulation S-K, "Securities Authorized for Issuance Under Equity Compensation Plans," is referenced under Item 12 of Part III of this Annual Report on Form 10-K.

Corporate Performance Graph

The following performance graph and related information shall not be deemed to be "soliciting material" or to be "filed" with the SEC, nor shall such information be incorporated by reference into any future filing under the Securities Act of 1933, as amended, or the Securities Act, except to the extent that we specifically incorporate it by reference into such filing.

The following graph compares the performance of our Class A common stock to the Nasdaq Benchmark TR Index (U.S.) and to the Nasdaq Pharmaceutical Benchmark TR Index (U.S.) from December 31, 2013 through December 31, 2018. The comparison assumes $100 was invested after the market closed on December 31, 2013 in our Class A common stock and in each of the presented indices, and it assumes reinvestment of dividends, if any.

COMPARISON OF QUARTERLY CUMULATIVE TOTAL RETURN
Among The Nasdaq Benchmark TR Index (U.S.),
the Nasdaq Pharmaceutical Benchmark TR Index (U.S.)
and Ironwood Pharmaceuticals, Inc.



Item 6. ***Selected Financial Data***

You should read the following selected financial data together with our consolidated financial statements and the related notes appearing elsewhere in this Annual Report on Form 10-K. We have derived the consolidated statements of operations data for the years ended December 31, 2018, 2017 and 2016 and the consolidated balance sheet data as of December 31, 2018 and 2017 from our audited financial statements included elsewhere in this Annual Report on Form 10-K. We have derived the consolidated statements of operations data for the years ended December 31, 2015 and 2014 and the consolidated balance sheet data as of December 31, 2016, 2015, and 2014 from our audited financial statements not included in this Annual Report on Form 10-K. Our historical results for any prior period are not necessarily indicative of results to be expected in any future period.

	Year Ended December 31,				
	2018	2017	2016	2015	2014
	(in thousands, except per share data)				
Consolidated Statement of Operations Data:					
Revenues:					
Collaborative arrangements revenue [1]	$ 272,839	$ 265,533	$263,923	$ 149,040	$ 68,915
Product revenue, net	3,445	3,061	109	—	—
Sale of active pharmaceutical ingredient	70,355	29,682	9,925	515	7,521
Total Revenues	346,639	298,276	273,957	149,555	76,436
Cost and expenses:					
Cost of revenues [2]	32,751	19,097	1,868	12	5,291
Write-down of commercial supply and inventory to net realizable value and loss on non-cancellable purchase commitments [3]	247	309	374	17,638	20,292
Research and development [4]	166,503	148,228	139,492	108,746	101,890
Selling, general and administrative [4]	241,291	233,123	173,281	125,247	118,333
Amortization of acquired intangible asset [5]	8,111	6,214	981	—	—
(Gain) loss on fair value remeasurement of contingent consideration [6]	(31,045)	(31,310)	9,831	—	—
Restructuring expenses [7]	15,879	—	—	—	—
Impairment of intangible assets [8]	151,794	—	—	—	—
Total cost and expenses	585,531	375,661	325,827	251,643	245,806
Loss from operations	(238,892)	(77,385)	(51,870)	(102,088)	(169,370)
Other (expense) income:					
Interest expense	(37,724)	(36,370)	(39,153)	(31,096)	(21,166)
Interest and investment income	2,991	2,111	1,169	443	257
(Loss) gain on derivatives [9]	(8,743)	(3,284)	8,146	(9,928)	—
Loss on extinguishment of debt [10]	—	(2,009)	—	—	—
Other income	—	—	—	—	661
Other expense, net	(43,476)	(39,552)	(29,838)	(40,581)	(20,248)
Net loss	$(282,368)	$(116,937)	$ (81,708)	$(142,669)	$(189,618)
Net loss per share—basic and diluted	$ (1.85)	$ (0.78)	$ (0.56)	$ (1.00)	$ (1.39)
Weighted average number of common shares used in net loss per share—basic and diluted:	152,634	148,993	144,928	142,155	136,811

(1) Collaborative arrangements revenue for the year ended December 31, 2018 included approximately $264.2 million related to our share of sales of LINZESS in the U.S., which includes a $29.9 million adjustment related to a change in estimate of gross-to-net sales reserves and allowances, primarily associated with governmental and contractual rebates.

Collaborative arrangements revenue for the year ended December 31, 2017 included approximately $256.2 million related to our share of sales of LINZESS in the U.S.

Collaborative arrangements revenue for the year ended December 31, 2016 included approximately $217.7 million related to our share of sales of LINZESS in the U.S. and $30.0 million related to the receipt of milestone payments

under our license agreement with Astellas for the filing and approval of a new drug application for LINZESS with the Japanese Ministry of Health, Labor and Welfare.

Collaborative arrangements revenue for the year ended December 31, 2014 includes approximately $10.2 million related to the receipt of a milestone payment under our license agreement with Astellas for the enrollment of the first study subject in a Phase III study for linaclotide in Japan, which was achieved in November 2014, and also includes approximately $1.9 million in payments from Almirall related to the achievement of two commercial milestones under the license agreement with Almirall.

(2) Cost of revenues for the year ended December 31, 2018 included approximately $31.6 million related to sales of API.

Cost of revenues for the year ended December 31, 2017 included approximately $2.6 million related to ZURAMPIC and DUZALLO product sales.

(3) During the year ended December 31, 2018, we wrote down approximately $0.2 million of ZURAMPIC commercial supply as a result of revised demand forecasts due to the exit of the Lesinurad License.

During the years ended December 31, 2017 and 2016, we wrote down approximately $0.3 million and approximately $0.4 million, respectively, of prepaid ZURAMPIC commercial supply primarily as a result of revised demand forecasts.

During the year ended December 31, 2015, we recorded expenses of approximately $17.6 million for the write-down of inventory and an accrual for excess non-cancelable inventory purchase commitments related to linaclotide API. These charges primarily related to a reduction in the near term demand forecast for CONSTELLA in the European territory by Almirall, our former European partner; regulatory changes made by the China Food and Drug Administration to the marketing approval process in China; and the amendment to the license agreement with Allergan pertaining to the development and commercialization of linaclotide for Europe executed in October 2015. Pursuant to the terms of the amendment, Allergan assumed responsibility for the manufacturing of linaclotide API for Europe, as well as the associated costs, which resulted in accruing for a loss on non-cancelable inventory purchase commitments under one of our API supply agreements covering the commercial supply of linaclotide API for the European market.

During the year ended December 31, 2014, we recorded approximately $20.3 million as a write-down of inventory to an estimated net realizable value of approximately $5.0 million. This write-down was primarily attributable to Almirall's reduced inventory demand forecasts for the European territory, mainly due to the suspension of commercialization of CONSTELLA in Germany and a challenging commercial environment throughout Europe.

These charges are more fully described in Note 8, *Inventory* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

(4) During the year ended December 31, 2014, we recorded approximately $4.2 million of costs related to a reduction in workforce in the three months ended March 31, 2014, including employee severance, benefits and related costs and adjustments. These costs are reflected in our consolidated statement of operations for the year ended December 31, 2014 as approximately $3.0 million in research and development expenses and approximately $1.2 million in selling, general and administrative expenses.

(5) Amortization of acquired intangible asset is based on the economic consumption of intangible assets. Our amortization was related to the ZURAMPIC and DUZALLO intangible assets, which were amortized on a straight-line basis over the estimated useful life. The increase in amortization expense in 2018 was driven by the developed technology – DUZALLO intangible asset. We began commercializing DUZALLO in September 2017.

(6) Gain (loss) on fair value remeasurement of contingent consideration is related to our contingent consideration liability pursuant to our exclusive license to develop, manufacture, and commercialize products containing lesinurad as an active ingredient, including ZURAMPIC and DUZALLO, in the U.S. The contingent consideration liability is revalued at each reporting period and changes in the fair value, other than changes due to payments, are recognized as a gain (loss) on fair value remeasurement of contingent consideration in our statement of operations. Adjustments

are recorded when there are changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to our credit risk, which is based on the estimated cost of debt for market participants.

During the year ended December 31, 2018, we decreased our projected revenue assumptions associated with the sales of ZURAMPIC and DUZALLO due to the notice of termination of the Lesinurad License. As a result, a gain on fair value remeasurement of contingent consideration of approximately $31.0 million was recorded during the year ended December 31, 2018.

During the year ended December 31, 2017, we decreased our ZURAMPIC and DUZALLO revenue projections. Accordingly, the expected estimated future royalty and milestone payments to AstraZeneca decreased, resulting in an approximately $31.3 million decrease to the contingent consideration liability.

(7) During the year ended December 31, 2018, we incurred approximately $15.9 million in restructuring expenses primarily due to costs associated with the workforce reductions as a result of our evaluation of the optimal mix of investments for the lesinurad franchise, our subsequent decision to terminate the Lesinurad License and the associated contract termination costs, as well as our intention to separate into two independent publicly traded companies.

(8) During the year ended December 31, 2018, we recorded a charge of approximately $151.8 million due to the impairment of the ZURAMPIC and DUZALLO intangible assets as a result of the revised net cash flow assumptions and the exit of the Lesinurad License.

(9) Gain (loss) on derivatives consists of the change in fair value of our Convertible Note Hedges and Note Hedge Warrants, which are recorded as derivative assets and liabilities. The Convertible Note Hedges and the Note Hedge Warrants are recorded at fair value at each reporting period and changes in fair value are recorded in our consolidated statements of operations. The Convertible Note Hedges and Note Hedge Warrants are more fully described in Note 7, *Fair Value of Financial Instruments* , and Note 11, *Notes Payable* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

(10) Loss on extinguishment of debt was due to the write-off of remaining unamortized debt issuance costs on the 11% PhaRMA Notes due 2024, or the PhaRMA Notes, as part of the redemption in January 2017.

	Year Ended December 31,				
	2018	2017	2016	2015	2014
	(in thousands)				
Consolidated Balance Sheet Data:					
Cash, cash equivalents and available-for-sale securities	$ 173,172	$221,416	$305,216	$439,394	$248,334
Working capital (excluding deferred revenue)	146,911	245,569	289,050	430,931	234,957
Total assets	332,050	605,674	709,821	619,121	329,322
Deferred revenue, including current portion	—	—	—	8,989	16,180
Debt financing and convertible notes, including current portion [(1)]	413,692	396,091	366,492	378,548	169,405
Capital lease obligations, including current portion	231	4,077	6,309	2,937	3,723
Total liabilities	528,421	595,826	643,105	523,996	240,770
Total stockholders' (deficit) equity	(196,371)	9,848	66,716	95,125	88,552

(1) Debt financing and convertible notes, including current portion, as of December 31, 2016 includes approximately $132.2 relating to the PhaRMA Notes, which were redeemed, in full, in connection with the funding and issuance in January 2017 of $150.0 million in aggregate principal amount of 8.375% notes due 2026, or the 2026 Notes, and approximately $234.2 relating to the convertible notes.

Item 7. *Management's Discussion and Analysis of Financial Condition and Results of Operations*

Forward-Looking Information

The following discussion of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and the notes to those financial statements appearing elsewhere in this Annual Report on Form 10-K. This discussion contains forward-looking statements that involve significant risks and uncertainties. As a result of many factors, such as those set forth under "Risk Factors" in Item 1A of this Annual Report on Form 10-K, our actual results may differ materially from those anticipated in these forward-looking statements.

Overview

We are a gastrointestinal, or GI, focused healthcare company leveraging our proven development and commercial capabilities as we seek to bring multiple medicines to patients. We are advancing innovative product opportunities in areas of large unmet need, capitalizing on our expertise in GI diseases.

Our commercial product, linaclotide, is available to adult men and women suffering from irritable bowel syndrome with constipation, or IBS-C, or chronic idiopathic constipation, or CIC, in certain countries around the world. Linaclotide is available under the trademarked name LINZESS ® to adult men and women suffering from IBS-C or CIC in the United States, or the U.S., and Mexico, and to adult men and women suffering from IBS-C in Japan. Linaclotide is available under the trademarked name CONSTELLA ® to adult men and women suffering from IBS-C or CIC in Canada, and to adult men and women suffering from IBS-C in certain European countries.

We and our partner Allergan plc (together with its affiliates), or Allergan, began commercializing LINZESS in the U.S. in December 2012. Under our collaboration with Allergan for North America, total net sales of LINZESS in the U.S., as recorded by Allergan, are reduced by commercial costs incurred by each party, and the resulting amount is shared equally between us and Allergan. Allergan has an exclusive license from us to develop and commercialize linaclotide in the Allergan License Territory, which is comprised of all countries other than China, Hong Kong, Macau, Japan, and the countries and territories of North America. On a country-by-country and product-by-product basis in the Allergan License Territory, Allergan pays us royalties as a percentage of net sales of products containing linaclotide as an active ingredient. In addition, Allergan has exclusive rights to commercialize linaclotide in Canada as CONSTELLA and in Mexico as LINZESS.

Astellas Pharma Inc., or Astellas, our partner in Japan, has an exclusive license to develop and commercialize linaclotide in Japan. In March 2017, Astellas began commercializing LINZESS for the treatment of adults with IBS-C in Japan, and in September 2018, Astellas began commercializing LINZESS for the treatment of adult patients with chronic constipation in Japan. In October 2012, we entered into a collaboration agreement with AstraZeneca AB (together with its affiliates), or AstraZeneca, to co-develop and co-commercialize linaclotide in China, Hong Kong and Macau, with AstraZeneca having primary responsibility for the local operational execution. In January 2019, the National Medical Products Administration approved the marketing application for LINZESS for adults with IBS-C in China.

We and Allergan are exploring ways to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions. In July 2018, we announced the initiation of a Phase IIIb trial evaluating the efficacy and safety of linaclotide 290 mcg on multiple abdominal symptoms in addition to pain, including bloating and discomfort, in adult patients with IBS-C.

We and Allergan are also seeking to expand the clinical utility of linaclotide by demonstrating the pain-relieving effect of a delayed release formulation through the advancement of MD-7246 (linaclotide delayed release) in IBS with diarrhea ("IBS-D").

We are also advancing another GI development program, IW-3718, a gastric retentive formulation of a bile acid sequestrant, for the potential treatment of persistent gastroesophageal reflux disease, or persistent GERD. In June 2018, we initiated two Phase III clinical trials evaluating the safety and efficacy of IW-3718 in patients with persistent GERD.

As part of our strategy, we have also established development and commercial capabilities that we plan to leverage as we seek to bring multiple medicines to patients. We intend to play an active role in the development and

commercialization of our products in the U.S., and to establish a strong global brand by out-licensing commercialization rights in other territories to high-performing partners.

In August 2015, we and Allergan entered into an agreement for the co-promotion of VIBERZI ® (eluxadoline) in the U.S., Allergan's treatment for adults suffering from IBS-D, which expired in December 2017. In January 2017, we and Allergan entered into a commercial agreement under which the adjustments to our or Allergan's share of the net profits under the share adjustment provision of the collaboration agreement for linaclotide in North America are eliminated, in full, in 2018 and all subsequent years. In addition, Allergan appointed us, on a non-exclusive basis, to promote CANASA ® (mesalamine), approved for the treatment of ulcerative proctitis, and DELZICOL ® (mesalamine), approved for the treatment of ulcerative colitis, in the U.S. for approximately two years. In December 2017, this agreement was amended to include the promotion of VIBERZI through December 31, 2018 and to discontinue the promotion of DELZICOL effective January 1, 2018. In December 2018, we and Allergan entered into an agreement to discontinue our promotion of CANASA effective December 31, 2018, and to extend our promotion of VIBERZI through March 31, 2019. These agreements are more fully described in Note 5, *Collaboration, License, Co-Promotion and Other Commercial Agreements* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

We were incorporated in Delaware on January 5, 1998 as Microbia, Inc. On April 7, 2008, we changed our name to Ironwood Pharmaceuticals, Inc. We operate in one reportable business segment—human therapeutics.

To date, we have dedicated a majority of our activities to the research, development and commercialization of linaclotide and the commercialization of lesinurad, as well as to the research and development of our other product candidates. We have incurred significant operating losses since our inception in 1998. As of December 31, 2018, we had an accumulated deficit of approximately $1.6 billion. We are unable to predict the extent of any future losses or guarantee when, or if, our company will become cash flow positive.

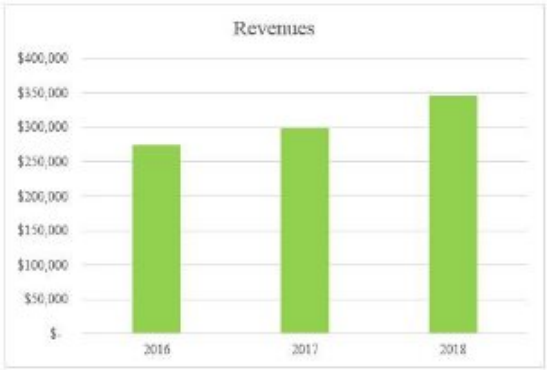
In May 2018, we announced the intent to separate into two publicly traded companies, Ironwood and Cyclerion Therapeutics, Inc., or Cyclerion. Cyclerion is expected to be a clinical-stage biopharmaceutical company harnessing the power of soluble guanylate cyclase, or sGC, pharmacology to discover, develop and commercialize breakthrough treatments for serious and orphan diseases. Upon separation, Cyclerion plans to focus on enabling the full therapeutic potential of next-generation sGC stimulators. sGC stimulators are small molecules that act synergistically with nitric oxide on sGC to boost production of cyclic guanosine monophosphate, or cGMP. cGMP is a key second messenger that, when produced by sGC, regulates diverse and critical biological functions throughout the body including blood flow and vascular dynamics, inflammatory and fibrotic processes, metabolism and neuronal function. Cyclerion believes that the key to unlocking the full therapeutic potential of the nitric oxide-cGMP pathway is to design differentiated next-generation sGC stimulators that preferentially modulate pathway signaling in tissues of greatest relevance to the diseases they are developed to treat. This targeted approach is intended to maximize the potential benefits of nitric oxide-cGMP pathway stimulation in disease-relevant tissues.

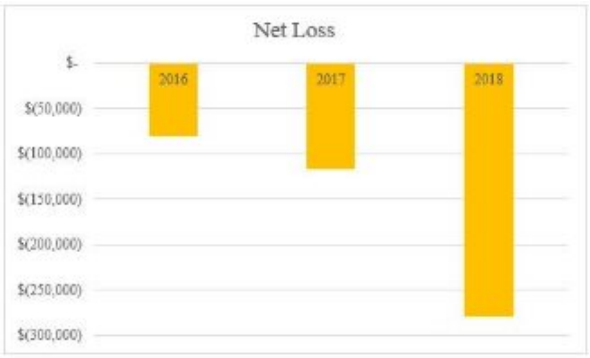
Cyclerion's portfolio is anticipated to be comprised of several sGC stimulators. Olinciguat is a vascular sGC stimulator in Phase II development for the potential treatment of sickle cell disease. In June 2018, the FDA granted Orphan Drug Designation to olinciguat for the treatment of patients with sickle cell disease. Praliciguat is a systemic sGC stimulator in Phase II development for the potential treatment of heart failure with preserved ejection fraction, or HFpEF. In September 2018, the FDA granted Fast Track Designation for praliciguat for the treatment of patients with HFpEF. Cyclerion is expected to advance additional sGC stimulator development programs in pre-clinical and discovery phases.

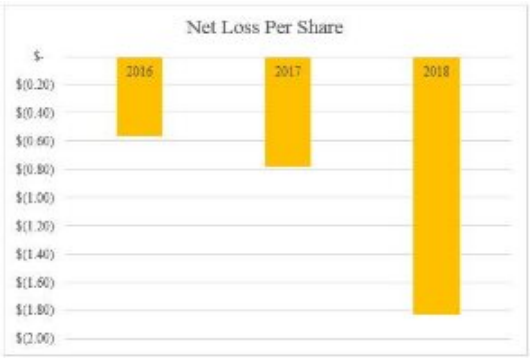
In February 2019, following further analysis of our strategy and core business needs, and in an effort to further strengthen the operational efficiency of our organization, we commenced a reduction in our workforce by 35 employees, primarily based in the home office. Refer to Note 20, *Subsequent Events* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

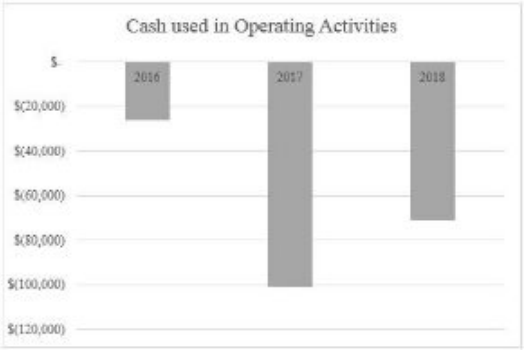
Key Performance Indicators
(dollars in thousands, per share amounts in dollars)

The following charts summarize key metrics of revenue, earnings (losses), and operating cash use:









These metrics are more fully described in the *Results of Operations* and *Liquidity and Capital Resources* sections below.

Financial Overview

Revenues. Our revenues are generated primarily through our collaborative arrangements and license agreements related to research and development and commercialization of linaclotide, as well as co-promotion arrangements in the U.S. and product revenue related to the commercial sale of ZURAMPIC and DUZALLO in the U.S. Effective January 1, 2018, we adopted Accounting Standards Codification, or ASC, Topic 606, *Revenue from Contracts with* Customers, or ASC 606, using the modified retrospective transition method. The adoption of ASC 606 represents a change in accounting principle that aims to more closely align revenue recognition with the delivery of our services and will provide financial statement readers with enhanced disclosures. In accordance with ASC 606, we recognize revenue when the customer obtains control of a promised good or service, in an amount that reflects the consideration which we expect to receive in exchange for the good or service. The reported results for the year ended December 31, 2018 reflect the application of ASC 606 guidance, while the reported results for the years ended December 31, 2017 and 2016 were prepared in accordance with ASC 605, *Revenue Recognition,* or ASC 605. Upon adoption of ASC 606, we concluded that no cumulative adjustment to the accumulated deficit as of January 1, 2018 was necessary. The adoption of ASC 606 had no impact on our consolidated statement of operations, consolidated balance sheets, or consolidated statement of cash flows.

The terms of the collaborative research and development, license and co-promotion agreements contain multiple performance obligations which may include (i) licenses, (ii) research and development activities, (iii) the manufacture of finished drug product, active pharmaceutical ingredient, or API, or development materials for a partner which are reimbursed at a contractually determined rate, and (iv) co-promotion activities by our clinical sales specialists. Payments to us may include (i) up-front license fees, (ii) payments for research and development activities, (iii) payments for the manufacture of finished drug product, API or development materials, (iv) payments based upon the achievement of certain milestones, (v) payments for sales detailing, promotional support services and medical education initiatives and (vi) royalties on product sales. Additionally, we receive our share of the net profits or bear our share of the net losses from the sale of linaclotide in the U.S. and China.

We record our share of the net profits and losses from the sales of LINZESS in the U.S. on a net basis and present the settlement payments to and from Allergan as collaboration expense or collaborative arrangements revenue, as applicable. Net profits or losses consist of net sales to third-party customers and sublicense income in the U.S. less the cost of goods sold as well as selling, general and administrative expenses. Although we expect net sales to increase over time, the settlement payments between Allergan and us, resulting in collaborative arrangements revenue or collaboration expense, are subject to fluctuation based on the ratio of selling, general and administrative expenses incurred by each party. In addition, our collaborative arrangements revenue may fluctuate as a result of the timing and amount of license fees and clinical and commercial milestones received and recognized under our current and future strategic partnerships as well as timing and amount of royalties from the sales of linaclotide in the European, Canadian or Mexican markets or any other markets where linaclotide receives approval.

Product revenue is recognized when the Distributor obtains control of our product, which occurs at a point in time, typically upon shipment of ZURAMPIC and DUZALLO, or the Lesinurad Products, to the Distributor. When we perform shipping and handling activities after the transfer of control to the Distributor (e.g., when control transfers prior to delivery), they are considered as fulfillment activities, and accordingly, the costs are accrued for when the related revenue is recognized. Taxes collected from Customers relating to product sales and remitted to governmental authorities are excluded from revenues. We expense incremental costs of obtaining contracts with Distributors as and when incurred if the expected amortization period of the asset that we would have recognized is one year or less.

We evaluate the creditworthiness of each of our Distributors to ensure it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur. We calculate our net product revenue based on the wholesale acquisition cost that we charge our Distributors for the Lesinurad Products less variable consideration. The product revenue variable consideration consists of estimates relating to (i) trade discounts and allowances, such as invoice discounts for prompt payment and distributor fees, (ii) estimated government and private payor rebates, chargebacks and discounts, such as Medicaid reimbursements, (iii) reserves for expected product returns and (iv)

estimated costs of incentives offered to certain indirect customers including patients. These estimates could be adjusted based on actual results in the period such variances become known.

Cost of Revenues. Cost of revenues includes cost of collaborative arrangements revenue related to the sales of linaclotide API and drug product, as well as the cost of product revenue related to sales of the Lesinurad Products in the U.S. Cost related to the sales of linaclotide API and drug product are recognized upon shipment of linaclotide API and drug product to certain of our partners outside of the U.S. Our cost of collaborative arrangements revenue for linaclotide consists of the internal and external costs of producing such API and drug product for certain of our partners outside of the U.S. Cost of product revenue related to the sales of the Lesinurad Products in the U.S. includes the cost of producing finished goods that correspond with product revenue for the reporting period, such as third-party supply and overhead costs, as well as certain period costs related to freight, packaging, stability and quality testing, and customer acquisition.

Write-down of Inventory to Net Realizable Value and Loss on Non-cancelable Inventory and Commercial Supply Purchase Commitments. During the year ended December 31, 2018, we wrote down approximately $0.3 million primarily related to lesinurad inventory and commercial supply purchase commitments as a result of revised demand forecasts and the notice of termination of the Lesinurad License. During the year ended December 31, 2018, we assigned to Allergan certain linaclotide excess non-cancelable purchase commitments that we had previously accrued for. Accordingly, we relieved the previous accrual of approximately $2.5 million.

During the year ended December 31, 2017, we wrote down approximately $0.3 million of lesinurad commercial supply purchase commitments as a result of revised demand forecasts. During the year ended December 31, 2016, we wrote down approximately $0.4 million in commercial supply purchase commitments.

These charges are more fully described in Note 8, *Inventory,* and Note 12, *Commitments and Contingencies* to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Research and Development Expense. Research and development expense consists of expenses incurred in connection with the discovery and development of our product candidates. These expenses consist primarily of compensation, benefits and other employee-related expenses, research and development related facility costs, third-party contract costs relating to nonclinical study and clinical trial activities, development of manufacturing processes, regulatory registration of third-party manufacturing facilities, as well as licensing fees for our product candidates. We charge all research and development expenses to operations as incurred. Under our linaclotide collaboration agreements with Allergan for the U.S. and AstraZeneca for China, Hong Kong and Macau, we are reimbursed for certain research and development expenses, and we net these reimbursements against our research and development expenses as incurred. Amounts owed to Allergan or AstraZeneca for such linaclotide territories are recorded as incremental research and development expense.

The core of our research and development strategy is to leverage our development capabilities, as well as our pharmacologic expertise, to bring multiple medicines to patients. We are advancing innovative product opportunities in areas of large unmet need, including IBS-C and CIC, abdominal pain associated with IBS and persistent GERD. In addition, prior to the planned separation of the companies, we are also advancing innovative product opportunities in diabetic nephropathy, HFpEF and serious and orphan diseases, such as sickle cell disease.

Linaclotide . Linaclotide is the first FDA-approved guanylate cyclase type-C, or GC-C, agonist. Linaclotide is approved and commercially available in the U.S., Japan and in a number of E.U. and other countries.

We and Allergan are exploring ways to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions. In January 2017, the FDA approved a 72 mcg dose of LINZESS for adults with CIC, which became available in the U.S. in March 2017. In July 2018, we announced the initiation of a Phase IIIb trial evaluating the efficacy and safety of linaclotide 290 mcg on multiple abdominal symptoms in addition to pain, including bloating and discomfort, in adult patients with IBS-C.

We and Allergan are also seeking to advance the clinical utility of linaclotide by demonstrating the pain-relieving effect of a delayed release formulation through the advancement of MD-7246 in IBS-D. We and Allergan have established a plan with the FDA for clinical pediatric programs with linaclotide, as described below.

IW-3718. We are advancing our persistent GERD program through the development of IW-3718, a gastric retentive formulation of a bile acid sequestrant. IW-3718 is designed to release in the stomach over an extended period of time, bind to bile that refluxes into the stomach, and potentially provide symptomatic relief in patients with persistent GERD. In June 2018, we announced the initiation of two Phase III clinical trials evaluating the safety and efficacy of IW-3718 in patients with persistent GERD.

We have additional assets in early development that we continue to advance, and we are exploring strategic options for further development of these assets.

Discovery Research. Our discovery efforts are primarily focused on identifying novel clinical candidates that draw on our proprietary and expanding expertise in GI disorders and GC pathways through December 31, 2018.

The following table sets forth our research and development expenses related to our product pipeline for the years ended December 31, 2018, 2017, and 2016. These expenses relate primarily to internal compensation, benefits and other employee-related expenses and external costs associated with nonclinical studies and clinical trial costs for our product candidates. We allocate costs related to facilities, depreciation, share-based compensation, research and development support services, laboratory supplies and certain other costs directly to programs.

	Year Ended December 31,		
	2018	2017	2016
	(in thousands)		
Linaclotide [1]	$ 33,749	$ 33,042	$ 40,130
Lesinurad [2]	5,184	17,764	18,413
Development candidates:			
GI disorders (two compounds) [3]	38,968	16,876	27,795
Vascular and fibrotic disorders (two compounds) [3]	52,127	50,826	29,809
Central nervous system disorders (one compound) [3]	12,322	8,290	853
Total development candidates	103,417	75,992	58,457
Discovery research	24,153	21,430	22,492
Total research and development expenses	$ 166,503	$ 148,228	$ 139,492

(1) Includes linaclotide in all indications, populations and formulations.
(2) Includes lesinurad in all indications, populations and formulations.
(3) Number of compounds includes clinical-stage development candidates for the year ended December 31, 2018.

Since 2004, the date we began tracking costs by program, we have incurred approximately $462.5 million of research and development expenses related to linaclotide. The expenses for linaclotide include both our portion of the research and development costs incurred by Allergan for the U.S. and AstraZeneca for China, Hong Kong and Macau and invoiced to us under the cost-sharing provisions of our collaboration agreements, as well as the unreimbursed portion of research and development costs incurred by us under such cost-sharing provisions.

The lengthy process of securing regulatory approvals for new drugs requires the expenditure of substantial resources. Any failure by us to obtain, or any delay in obtaining, regulatory approvals would materially adversely affect our product development efforts and our business overall.

In connection with the FDA approval of LINZESS, we are required to conduct certain nonclinical and clinical studies, including those aimed at understanding: (a) whether orally administered linaclotide can be detected in breast milk, (b) the potential for antibodies to be developed to linaclotide, and if so, (c) whether antibodies specific for linaclotide could have any therapeutic or safety implications. In addition, we and Allergan established a nonclinical and clinical post-marketing plan with the FDA to understand the efficacy and safety of LINZESS in pediatric patients. We and Allergan are advancing clinical pediatric programs in IBS-C patients age seven to 17 and functional constipation patients age six to 17. We and Allergan are also exploring development opportunities to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions. In October 2012, we entered into a collaboration agreement with AstraZeneca to co-develop and co-commercialize linaclotide in China, Hong Kong and Macau, with AstraZeneca having primary responsibility for the local operational execution. We cannot currently estimate with any degree of certainty the amount of time or money that

we will be required to expend in the future on linaclotide for other geographic markets within IBS-C and CIC, or in additional indications, populations or formulations.

In December 2015, the FDA approved ZURAMPIC for use in conjunction with an XOI for the treatment of hyperuricemia associated with uncontrolled gout. In connection with the FDA approval, the FDA has required a post-marketing clinical study to further evaluate the renal and cardiovascular safety of lesinurad, and has required that enrollment include patients with moderate renal impairment. In connection with the exit of the Lesinurad License, we are in the process of ending the post-marketing clinical study. The FDA approved DUZALLO, the fixed-dose combination product containing lesinurad and allopurinol, in August 2017 for the treatment of hyperuricemia associated with gout in patients who have not achieved goal serum uric acid levels with a medically appropriate daily dose of allopurinol alone.

We are also advancing IW-3718 targeting persistent GERD. Prior to the planned separation of the companies, we are also advancing praliciguat targeting diabetic nephropathy and HFpEF and olinciguat targeting sickle cell disease.

Given the inherent uncertainties that come with the development of pharmaceutical products, we cannot estimate with any degree of certainty how our programs will evolve, and therefore the amount of time or money that would be required to obtain regulatory approval to market them.

As a result of these uncertainties surrounding the timing and outcome of any approvals, we are currently unable to estimate precisely when, if ever, linaclotide's utility will be expanded within its currently approved indications; if or when linaclotide will be developed outside of its current markets, indications, populations or formulations; or when, if ever, any of our other product candidates will generate revenues and cash flows.

We invest carefully in our pipeline, and the commitment of funding for each subsequent stage of our development programs is dependent upon the receipt of clear, supportive data. In addition, we intend to access externally discovered drug candidates that fit within our core strategy. In evaluating these potential assets, we apply the same investment criteria as those used for investments in internally discovered assets.

The successful development of our product candidates is highly uncertain and subject to a number of risks including, but not limited to:

- The duration of clinical trials may vary substantially according to the type, complexity and novelty of the product candidate.
- The FDA and comparable agencies in foreign countries impose substantial and varying requirements on the introduction of therapeutic pharmaceutical products, typically requiring lengthy and detailed laboratory and clinical testing procedures, sampling activities and other costly and time-consuming procedures.
- Data obtained from nonclinical and clinical activities at any step in the testing process may be adverse and lead to discontinuation or redirection of development activity. Data obtained from these activities also are susceptible to varying interpretations, which could delay, limit or prevent regulatory approval.
- The duration and cost of discovery, nonclinical studies and clinical trials may vary significantly over the life of a product candidate and are difficult to predict.
- The costs, timing and outcome of regulatory review of a product candidate may not be favorable, and, even if approved, a product may face post-approval development and regulatory requirements.
- There may be substantial costs, delays and difficulties in successfully integrating externally developed product candidates into our business operations.
- The emergence of competing technologies and products and other adverse market developments may negatively impact us.

As a result of the factors discussed above, including the factors discussed under "Risk Factors" in Item 1A of this Annual Report on Form 10-K, we are unable to determine the duration and costs to complete current or future nonclinical and clinical stages of our product candidates or when, or to what extent, we will generate revenues from the commercialization and sale of our product candidates. Development timelines, probability of success and development

costs vary widely. We anticipate that we will make determinations as to which additional programs to pursue and how much funding to direct to each program on an ongoing basis in response to the data of each product candidate, the competitive landscape and ongoing assessments of such product candidate's commercial potential.

We expect to invest in our research and development programs for the foreseeable future. We will continue to invest in linaclotide, including the investigation of ways to enhance the clinical profile within its currently approved indications, and the exploration of its potential utility in other indications, populations and formulations. We will also invest in our other product candidates as we advance them through nonclinical studies and clinical trials, in addition to funding full-time equivalents for research and development activities under our external collaboration and license agreements.

Selling, General and Administrative Expense. Selling, general and administrative expense consists primarily of compensation, benefits and other employee-related expenses for personnel in our administrative, finance, legal, information technology, business development, commercial, sales, marketing, communications and human resource functions. Other costs include the legal costs of pursuing patent protection of our intellectual property, general and administrative related facility costs, insurance costs and professional fees for accounting and legal services. As we continue to invest in the commercialization of LINZESS, we expect our selling, general and administrative expenses will be substantial for the foreseeable future. We record all selling, general and administrative expenses as incurred.

Under our AstraZeneca collaboration agreement for linaclotide, we are reimbursed for certain selling, general and administrative expenses and we net these reimbursements against our selling, general and administrative expenses as incurred. We include Allergan's selling, general and administrative cost-sharing payments in the calculation of the net profits and net losses from the sale of LINZESS in the U.S. and present the net payment to or from Allergan as collaboration expense or collaborative arrangements revenue, respectively.

Amortization of Acquired Intangible Assets. Amortization expense was based on the economic consumption of intangible assets. Our amortization was related to the ZURAMPIC and DUZALLO intangible assets, which were amortized on a straight-line basis over the estimated useful life of the assets. We believe that the straight-line method of amortization represented the pattern in which the economic benefits of the intangible assets were consumed.

(Gain)/Loss on Fair Value Remeasurement of Contingent Consideration. Our contingent consideration obligation related to the Lesinurad Transaction consisted of the fair value of estimated future milestone and royalty payments. This liability was revalued at each reporting period. Changes in the fair value of our contingent consideration, other than changes due to payments, were recognized as a (gain)/loss on fair value remeasurement of contingent consideration in our consolidated statement of operations. Adjustments were recorded when there were changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to our credit risk, which was based on the estimated cost of debt for market participants.

Restructuring Expenses. We record costs and liabilities associated with exit and disposal activities in accordance with ASC 420, *Exit or Disposal Cost Obligations* . Such costs are based on estimates of fair value in the period the liabilities are incurred. We evaluate and adjusts these costs as appropriate for changes in circumstances as additional information becomes available.

Impairment of Intangible Assets. We evaluate the finite-lived intangible assets for impairment whenever events or changes in circumstances indicate the reduction in the fair value below their respective carrying amounts. In connection with each impairment assessment in which indicators of impairment have been identified, we compare the fair value of the asset as of the date of the assessment with the carrying value of the asset on our consolidated balance sheet. If an indicator of impairment exists, we compare the carrying value of the intangible asset or asset group to the undiscounted cash flows expected from that asset or asset group. If impairment is indicated by this test, the intangible asset is written down by the amount by which the discounted cash flows expected from the intangible asset exceeds its carrying value.

Other (Expense) Income. Interest expense consists primarily of cash and non-cash interest costs related to the 2022 Notes and the 2026 Notes. Non-cash interest expense consists of amortization of the debt discount and associated debt issuance costs associated with the 2022 Notes and 2026 Notes. We amortize these costs using the effective interest

rate method over the life of the respective note agreements as interest expense in our consolidated statements of operations.

Interest income consists of interest earned on our cash, cash equivalents and marketable securities.

In September 2016, we closed a direct private placement, pursuant to which we issued $150.0 million in aggregate principal amount of 8.375% notes due 2026 on January 5, 2017, or the Funding Date. The proceeds from the issuance of the 2026 Notes were used to redeem the outstanding principal balance of the PhaRMA Notes on the Funding Date. This transaction is more fully described in Note 11, *Notes Payable,* to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Critical Accounting Policies and Estimates

Our discussion and analysis of our financial condition and results of operations is based upon our consolidated financial statements prepared in accordance with U.S. generally accepted accounting principles. The preparation of these financial statements requires us to make certain estimates and assumptions that may affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements, and the amounts of revenues and expenses during the reported periods. Significant estimates and assumptions in our consolidated financial statements include those related to revenue recognition, including returns, rebates, and other pricing adjustments; available-for-sale securities; inventory valuation, and related reserves; impairment of long-lived assets, including its acquired intangible assets and goodwill; initial valuation procedures for the issuance of convertible notes; fair value of derivatives; balance sheet classification of notes payable and convertible notes; income taxes, including the valuation allowance for deferred tax assets; research and development expenses; contingent consideration; contingencies and share-based compensation. We base our estimates on our historical experience and on various other assumptions that are believed to be reasonable, the results of which form the basis for making judgments about the carrying values of assets and liabilities. Actual results may differ materially from our estimates under different assumptions or conditions. Changes in estimates are reflected in reported results in the period in which they become known.

We believe that our application of the following accounting policies, each of which require significant judgments and estimates on the part of management, are the most critical to aid in fully understanding and evaluating our reported financial results. Our significant accounting policies are more fully described in Note 2, *Summary of Significant Accounting Policies* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Fair Value Measurements

We have certain assets and liabilities that are measured at fair value on a recurring basis, and which have been classified as Level 1, 2 or 3 within the fair value hierarchy as described in the accounting standards for fair value measurements. In general, fair values determined by Level 1 inputs utilize observable inputs such as quoted prices in active markets for identical assets or liabilities. Fair values determined by Level 2 inputs utilize data points that are either directly or indirectly observable, such as quoted prices for similar instruments in active markets, interest rates and yield curves. Fair values determined by Level 3 inputs utilize unobservable data points in which there is little or no market data, which require us to develop our own assumptions for the asset or liability.

Our investment portfolio includes mainly fixed income securities that do not always trade on a daily basis. As a result, the pricing services we use apply other available information as applicable through processes such as benchmark yields, benchmarking of like securities, sector groupings and matrix pricing to prepare valuations. In addition, model processes are used to assess interest rate impact and develop prepayment scenarios. These models take into consideration relevant credit information, perceived market movements, sector news and economic events. The inputs into these models may include benchmark yields, reported trades, broker-dealer quotes, issuer spreads and other relevant data. We validate the prices provided by our third party pricing services by obtaining market values from other pricing sources and analyzing pricing data in certain instances.

We classify our derivative financial instruments and contingent consideration as Level 3 under the fair value hierarchy. The derivatives are not actively traded and are valued using the Black-Scholes option pricing model which requires the use of subjective assumptions, primarily the expected stock price volatility assumption. The contingent consideration is not actively traded and is valued using the Monte-Carlo simulation which requires the use of subjective

assumptions, including probability weighted net cash outflow projections, discounted using a yield curve equivalent to our credit risk, which was the estimated cost of debt financing for market participants. Adjustments are recorded when there are changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to our credit risk, which is based on the estimated cost of debt for market participants.

Inventory Valuation

Inventory is stated at the lower of cost or net realizable value with cost determined under the first-in, first-out basis in accordance with Accounting Standards Update, or ASU, No. 2015-11, *Inventory (Topic 330): Simplifying the Measurement of Inventory*.

We evaluate inventory levels quarterly and any inventory that has a cost basis in excess of its expected net realizable value, inventory that becomes obsolete, inventory in excess of expected sales requirements, inventory that fails to meet commercial sale specifications or is otherwise impaired is written down with a corresponding charge to the statement of operations in the period that the impairment is first identified. We also assess, on a quarterly basis, whether we have any excess non-cancelable purchase commitments resulting from minimum supply agreements with our suppliers. We rely on data from several sources to estimate the net realizable value of inventory and non-cancelable purchase commitments, including partner forecasts of projected inventory purchases that are received quarterly, our internal forecasts and related process, historical sales by geographic region, and the status of and progress toward commercialization of linaclotide in partnered territories.

We capitalize inventories manufactured in preparation for initiating sales of a product candidate when the related product candidate is considered to have a high likelihood of regulatory approval and the related costs are expected to be recoverable through sales of the inventories. In determining whether or not to capitalize such inventories, we evaluate, among other factors, information regarding the product candidate's safety and efficacy, the status of regulatory submissions and communications with regulatory authorities and the outlook for commercial sales, including the existence of current or anticipated competitive drugs and the availability of reimbursement. In addition, we evaluate risks associated with manufacturing the product candidate, including the ability of our third-party suppliers to complete the validation batches, and the remaining shelf life of the inventories.

Costs associated with developmental products prior to satisfying the inventory capitalization criteria are charged to research and development expense as incurred.

There is a risk inherent in these judgments and any changes in these judgments may have a material impact on our financial results in future periods.

Finite-Lived Intangible Assets

We record the fair value of purchased intangible assets with finite useful lives as of the transaction date of a business combination. Purchased intangible assets with finite useful lives are amortized to their estimated residual values over their estimated useful lives. We amortize intangible assets that have finite lives using either the straight-line method, or if reliably determinable, based on the pattern in which the economic benefit of the asset is expected to be utilized. We evaluate the finite-lived intangible assets for impairment whenever events or changes in circumstances indicate the reduction in the fair value below their respective carrying amounts. In addition, the remaining estimated useful life of the finite-lived intangible asset would be reassessed.

The value of our finite-lived intangible assets was based on the future expected net cash flows related to ZURAMPIC and DUZALLO (the "Lesinurad Products"), which included significant assumptions around future net sales and the respective investment to support these products.

We evaluate our finite-lived intangible assets for impairment whenever events or changes in circumstances indicate the reduction in the fair value below their respective carrying amounts. In connection with each impairment assessment in which indicators of impairment have been identified, we compare the fair value of the asset as of the date of the assessment with the carrying value of the asset on our consolidated balance sheet. If an indicator of impairment exists, we compare the carrying value of the intangible asset or asset group to the undiscounted cash flows expected from that asset or asset group. If impairment is indicated by this test, the intangible asset is written down by the amount

by which the discounted cash flows expected from the intangible asset exceeds its carrying value. To estimate the cash flows expected for the assets, we use market participant assumptions pursuant to Accounting Standards Codification ("ASC") 820 , *Fair Value* . For the lesinurad finite-lived intangible assets, we made significant assumptions as part of this assessment including but not limited to future net product sales, respective cost of product sales, and operating expenses. We believe that the following factors, among others, could trigger an impairment review: significant underperformance relative to historical or projected future operating results; significant changes in the manner of our use of the acquired assets or the strategy for our overall business; approval of competitive products; and significant negative industry or economic trends. If we determine that an impairment has occurred, a write-down of the carrying value and an impairment charge to operating expenses in the period the determination is made is recorded. During the year ended December 31, 2018, we recorded an impairment charge of approximately $151.8 million related to its ZURAMPIC and DUZALLO intangible assets. For additional information relating to the impairment of these assets, see Note 4, *Goodwill and Intangible Assets* , to the Company's consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Goodwill

Goodwill represents the difference between the purchase price and the fair value of the identifiable tangible and intangible net assets when accounted for using the purchase method of accounting. Goodwill is not amortized, but is reviewed for impairment. We test goodwill for impairment annually as of October 1st, or more frequently if events or changes in circumstances indicate that would more likely than not reduce the fair value of the reporting unit below its carrying value. Impairment may result from, among other things, deterioration in the performance of the acquired asset, adverse market conditions, adverse changes in applicable laws or regulations and a variety of other circumstances. If we determine that an impairment has occurred, a write-down of the carrying value and an impairment charge to operating expenses in the period the determination is made is recorded. In evaluating the carrying value of goodwill, we must make assumptions regarding estimated future cash flows and other factors. Changes in strategy or market conditions could significantly impact those judgments in the future and require an adjustment to the recorded balances.

Derivative Assets and Liabilities

In June 2015, in connection with the issuance of the 2022 Notes, we entered into the Convertible Note Hedges. Concurrently with entering into the Convertible Note Hedges, we also entered into certain warrant transactions in which we sold Note Hedge Warrants to the Convertible Note Hedge counterparties to acquire 20,249,665 shares of our Class A common stock, subject to customary anti-dilution adjustments. These instruments are derivative financial instruments under ASC Topic 815, *Derivatives and Hedging* .

These derivatives are recorded as assets or liabilities at fair value each reporting period and the fair value is determined using the Black-Scholes option-pricing model. The changes in fair value are recorded as a component of other (expense) income in the consolidated statements of operations. Significant inputs used to determine the fair value include the price per share of our Class A common stock on the date of valuation, time to maturity of the derivative instruments, the strike prices of the derivative instruments, the risk-free interest rate, and the volatility of our Class A common stock. Changes to these inputs could materially affect the valuation of the Convertible Note Hedges and Note Hedge Warrants in future periods.

Revenue Recognition

Effective January 1, 2018, we adopted ASU 2014-09, *Revenue from Contracts with Customers (Topic 606)* and related amendments ("ASU 2014-09") using the modified retrospective transition method. The adoption of ASU 2014-09 represents a change in accounting principle that aims to more closely align revenue recognition with the delivery of our products or services and will provide financial statement readers with enhanced disclosures. ASU 2014-09 also includes Subtopic 340-40, *Other Assets and Deferred Costs—Contracts with Customers,* which requires the deferral of incremental costs of obtaining a contract with a customer. In accordance with ASC 606, we recognize revenue when the customer obtains control of a promised good or service, in an amount that reflects the consideration which we expect to receive in exchange for the good or service. The reported results for the year ended December 30, 2018 reflect the application of ASC 606 guidance, while the reported results for prior periods were prepared in accordance with ASC 605. Upon adoption of ASC 606, we concluded that no cumulative adjustment to the accumulative deficit as of January 1, 2018 was necessary. There were no remaining or ongoing deliverables or unrecognized consideration as of December

31, 2017 that required an adjustment to the accumulated deficit. The adoption of ASC 606 had no impact on our consolidated statement of operations, consolidated balance sheets, or consolidated statement of cash flows.

As part of the ASC 606 adoption, we have utilized certain practical expedients outlined in the guidance. These practical expedients include:

- Expensing as incurred incremental costs of obtaining a contract, such as sales commissions, if the amortization period of the asset would be less than one year.
- Recognizing revenue in the amount that we have the right to invoice, when consideration from the customer corresponds directly with the value to the customer of our performance completed to date.
- For contracts that were modified before the beginning of the earliest reporting period presented in accordance with the pending content that links to this paragraph, an entity need not retrospectively restate the contract for those contract modifications in accordance with paragraphs ASC 606-10-25-12 through 25-13. Instead, an entity shall reflect the aggregate effect of all modifications that occur before the beginning of the earliest period presented in accordance with the pending content that links to this paragraph when: a. Identifying the satisfied and unsatisfied performance obligations b. Determining the transaction price and c. Allocating the transaction price to the satisfied and unsatisfied performance obligations.

Prior to the adoption of ASC 606, we recognized revenue when there was persuasive evidence that an arrangement existed, services had been rendered or delivery had occurred, the price was fixed or determinable, and collection was reasonably assured.

Our revenues are generated primarily through collaborative arrangements and license agreements related to the research and development and commercialization of linaclotide, as well as co-promotion arrangements in the U.S. and product revenue related to the commercial sale of ZURAMPIC and DUZALLO in the U.S. The terms of the collaborative research and development, license, co-promotion and other agreements contain multiple performance obligations which may include (i) licenses, (ii) research and development activities, including participation on joint steering committees, (iii) the manufacture of finished drug product, API, or development materials for a partner, which are reimbursed at a contractually determined rate, and (iv) co-promotion activities by our clinical sales specialists. Non-refundable payments to us under these agreements may include (i) up-front license fees, (ii) payments for research and development activities, (iii) payments for the manufacture of finished drug product, API, or development materials, (iv) payments based upon the achievement of certain milestones, (v) payments for sales detailing, promotional support services and medical education initiatives, and (vi) royalties on product sales. Additionally, we may receive our share of the net profits or bear our share of the net losses from the sale of linaclotide in the U.S. and for China, Hong Kong and Macau through our collaborations with Allergan and AstraZeneca, respectively. We have adopted a policy to recognize revenue net of tax withholdings, as applicable.

Revenue recognition under ASC 606

Upon executing a revenue generating arrangement, we assess whether it is probable we will collect consideration in exchange for the good or service it transfers to the customer. To determine revenue recognition for arrangements that we determine are within the scope of ASC 606, we perform the following five steps: (i) identify the contract(s) with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) we satisfy the performance obligations. We must develop assumptions that require significant judgment to determine the stand-alone selling price for each performance obligation identified in the contract. The assumptions that are used to determine the stand-alone selling price may include forecasted revenues, development timelines, reimbursement rates for personnel costs, discount rates and probabilities of technical and regulatory success.

Collaboration, License, Co-Promotion and Other Commercial Agreements

Upon licensing intellectual property, we determine if the license is distinct from the other performance obligations identified in the arrangement. We recognize revenues from the transaction price, including non-refundable, up-front fees allocated to the license when the license is transferred to the customer if the license has distinct benefit to

the customer. For licenses that are combined with other promises, we assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time. For performance obligations that are satisfied over time, we evaluate the measure of progress each reporting period and, if necessary, adjust the measure of performance and related revenue recognition.

Our license and collaboration agreements include milestone payments, such as development and other milestones. We evaluate whether the milestones are considered probable of being reached and estimate the amount to be included in the transaction price using the most likely amount method at the inception of the agreement. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within our control, such as regulatory approvals, are not considered probable of being achieved until those approvals are received. The transaction price is then allocated to each performance obligation on a relative stand-alone selling price basis, for which we recognize revenue as or when the performance obligations under the contract are satisfied. We re-evaluate the probability of achievement of such milestones and any related constraint at each reporting period, and any adjustments are recorded on a cumulative catch-up basis.

Agreements that include the supply API or drug product for either clinical development or commercial supply at the customer's discretion are generally considered as options. We assess if these options provide a material right to its partner, and if so, they are accounted for as separate performance obligations. If we are entitled to additional payments when the customer exercises these options, any additional payments are recorded as revenue when the customer obtains control of the goods, which is typically upon shipment for sales of API and upon delivery for sales of drug product.

For agreements that include sales-based royalties, including milestone payments based on the level of sales, and the license is deemed to be the predominant item to which the royalties relate, we recognize revenue when the related sales occur in accordance with the sales-based royalty exception under ASC 606-10-55-65.

Net Profit or Net Loss Sharing

In accordance with ASC 808 Topic, *Collaborative Arrangements* ("ASC 808"), we considered the nature and contractual terms of the arrangement and the nature of our business operations to determine the classification of payments under our collaboration agreements. While ASC 808 provides guidance on classification, the standard is silent on matters of separation, initial measurement, and recognition. Therefore, we, consistent with our accounting policies prior to the adoption of ASC 606, apply the separation, initial measurement, and recognition principles of ASC 606 to our collaboration agreements. We adopted ASU No. 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606* ("ASU 2018-18") during the three months ended December 31, 2018 and confirmed that, consistent with our initial conclusions, we will continue to analogize to ASC 606 for further guidance on areas such as separation, initial measurement, and recognition for our existing collaborative arrangements where applicable.

Our collaborative arrangements revenue generated from sales of LINZESS in the U.S. are considered akin to sales-based royalties. In accordance with the sales-based royalty exception, we recognize our share of the pre-tax commercial net profit or net loss generated from the sales of LINZESS in the U.S. in the period the product sales are earned, as reported by Allergan, and related cost of goods sold and selling, general and administrative expenses are incurred by us and our collaboration partner. These amounts are partially determined based on amounts provided by Allergan and involve the use of estimates and judgments, such as product sales allowances and accruals related to prompt payment discounts, chargebacks, governmental and contractual rebates, wholesaler fees, product returns, and co-payment assistance costs, which could be adjusted based on actual results in the future. We are highly dependent on Allergan for timely and accurate information regarding any net revenues realized from sales of LINZESS in the U.S. in accordance with both ASC 808 and ASC 606, and the costs incurred in selling it, in order to accurately report its results of operations. If we do not receive timely and accurate information or incorrectly estimate activity levels associated with the collaboration at a given point in time, we could be required to record adjustments in future periods.

In accordance with ASC 606-10-55, *Principal Agent Considerations* , we record revenue transactions as net product revenue in our consolidated statements of operations if it is deemed the principal in the transaction, which includes being the primary obligor, retaining inventory risk, and control over pricing. Given that we are not the primary obligor and do not have the inventory risks in the collaboration agreement with Allergan for North America, we record our share of the net profits or net losses from the sales of LINZESS in the U.S. on a net basis and presents the settlement payments to and from Allergan as collaboration expense or collaborative arrangements revenue, as applicable. We and Allergan settle the cost sharing quarterly, such that our statement of operations reflects 50% of the pre-tax net profit or loss generated from sales of LINZESS in the U.S.

Product revenue, net

Net product revenue is derived from sales of the Lesinurad Products in the U.S. We sell the Lesinurad Products principally to a limited number of national wholesalers and selected regional wholesalers (the "Distributors"). The Distributors resell the Lesinurad Products to retail pharmacies and healthcare providers, who then sell to patients.

Net product revenue is recognized when the Distributor obtains control of our product, which occurs at a point in time, typically upon shipment of Lesinurad Products to the Distributor. When we perform shipping and handling activities after the transfer of control to the Distributor (e.g., when control transfers prior to delivery), they are considered as fulfillment activities, and accordingly, the costs are accrued for when the related revenue is recognized. We expense incremental costs of obtaining a contract as and when incurred if the expected amortization period of the asset that we would have recognized is one year or less.

We evaluate the creditworthiness of each of its Distributors to determine whether it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur. We calculate our net product revenue based on the wholesale acquisition cost that we charge our Distributors for the Lesinurad Products less variable consideration. The product revenue variable consideration consists of estimates relating to (i) trade discounts and allowances, such as invoice discounts for prompt payment and distributor fees, (ii) estimated government and private payor rebates, chargebacks and discounts, such as Medicaid reimbursements, (iii) reserves for expected product returns and (iv) estimated costs of incentives offered to certain indirect customers including patients. These estimates could be adjusted based on actual results in the period such variances become known.

Trade Discounts and Allowances: We generally provide invoice discounts on sales of Lesinurad Products to our Distributors for prompt payment and pay fees for distribution services and for certain data that Distributors provide to us. Consistent with historical industry practice, we expect our Distributors to earn these discounts and fees, and accordingly deducts the full amount of these discounts and fees from our gross product revenues at the time such revenues are recognized.

Rebates, Chargebacks and Discounts: We contract with Medicaid, other government agencies and various private organizations ("Third-party Payors") to allow for eligible purchases of the Lesinurad Products at partial or full reimbursement from such Third-party Payors. We estimate the rebates, chargebacks and discounts we will be obligated to provide to Third-party Payors and deduct these estimated amounts from our gross product revenue at the time the revenue is recognized. Based upon (i) our contracts with these Third-party Payors, (ii) the government-mandated discounts applicable to government-funded programs, (iii) information obtained from our Distributors and third-parties regarding the payor mix for Lesinurad Products and (iv) historical industry information regarding the payor mix for analog products, we estimate the rebates, chargebacks and discounts that we will be obligated to provide to Third-party Payors.

Product Returns: We estimate the amount of Lesinurad Products that will be returned and deduct these estimated amounts from our gross revenue at the time the revenue is recognized. Our Distributors have the right to return unopened, unprescribed Lesinurad Products beginning six months prior to the labeled expiration date and ending twelve months after the labeled expiration date. The expiration date for the Lesinurad Products is at least 24 months after it has been converted into tablet form, which is the last step in the manufacturing process for Lesinurad Products and generally occurs within a few months before Lesinurad Products are delivered to us. We currently estimate product returns based on data provided to us by our Distributors and by other third parties, historical industry information regarding rates for similar pharmaceutical products, the estimated remaining shelf life of the Lesinurad Products previously shipped and currently being shipped to Distributors, and contractual agreements with our Distributors intended to limit the amount of inventory they maintain. Reporting from the Distributors includes Distributor sales and inventory held by Distributors, which provides us with visibility into the distribution channel in order to determine which products, if any, were eligible to be returned.

Other Incentives: Incentives that we offer include voluntary patient assistance programs, such as co-pay assistance programs which are intended to provide financial assistance to qualified commercially insured patients with prescription drug co-payments required by payors. The calculation of the accrual for co-pay assistance is based on an estimate of claims and the cost per claim that we expect to receive associated with product that has been recognized as revenue.

Product revenue is recorded net of the trade discounts, allowances, rebates, chargebacks, discounts, product returns, and other incentives. Certain of these adjustments are recorded as an accounts receivable reserve, while certain of these adjustments are recorded as accrued expenses.

Other

We produce linaclotide finished drug product, API and development materials for certain of our partners.

We recognize revenue on linaclotide finished drug product, API and development materials when control has transferred to the partner, which generally occurs upon shipment for sales of API and upon delivery for drug product, after the material has passed all quality testing required for collaborator acceptance. As it relates to development materials and API produced for Astellas, we are reimbursed at a contracted rate. Such reimbursements are considered as part of revenue generated pursuant to the Astellas license agreement and are presented as collaborative arrangements revenue. Any linaclotide finished drug product, API and development materials currently produced for Allergan for the U.S. or AstraZeneca for China, Hong Kong and Macau are recognized in accordance with the cost-sharing provisions of the Allergan and AstraZeneca collaboration agreements, respectively.

Revenue recognition prior to the adoption of ASC 606

Agreements Entered into Prior to January 1, 2011

For arrangements that include multiple deliverables and were entered into prior to January 1, 2011, we followed the provisions of ASC Topic 605-25, *Revenue Recognition—Multiple-Element Arrangements* , or ASC 605-25, in accounting for these agreements. Under ASC 605-25, we were required to identify the deliverables included within the agreement and evaluate which deliverables represent separate units of accounting. Collaborative research and development and licensing agreements that contained multiple deliverables were divided into separate units of accounting when the following criteria were met:

- Delivered element(s) had value to the collaborator on a standalone basis,
- There was objective and reliable evidence of the fair value of the undelivered obligation(s), and
- If the arrangement included a general right of return relative to the delivered item(s), delivery or performance of the undelivered item(s) was considered probable and substantially within our control.

We allocated arrangement consideration among the separate units of accounting either on the basis of each unit's respective fair value or using the residual method, and applied the applicable revenue recognition criteria to each of the separate units. If the separation criteria were not met, revenue of the combined unit of accounting was recorded based on the method appropriate for the last delivered item.

Agreements Entered into or Materially Modified on or after January 1, 2011 and prior to January 1, 2018

We evaluated revenue from multiple element agreements entered into on or after January 1, 2011 under ASU No. 2009-13, *Multiple-Deliverable Revenue Arrangements* ("ASU 2009-13"), or ASC 605, until the adoption of ASC 606. We also evaluated whether amendments to its multiple element arrangements were considered material modifications that were subject to the application of ASU 2009-13. This evaluation required management to assess all relevant facts and circumstances and to make subjective determinations and judgments.

When evaluating multiple element arrangements under ASU 2009-13, we considered whether the deliverables under the arrangement represented separate units of accounting. This evaluation required subjective determinations and required management to make judgments about the individual deliverables and whether such deliverables were separable from the other aspects of the contractual relationship. In determining the units of accounting, management evaluated certain criteria, including whether the deliverables had standalone value, based on the consideration of the relevant facts and circumstances for each arrangement. Factors considered in this determination included the research, manufacturing and commercialization capabilities of the partner and the availability of relevant research and manufacturing expertise in the general marketplace. In addition, we considered whether the collaborator can use the license or other deliverables for

their intended purpose without the receipt of the remaining elements, and whether the value of the deliverable was dependent on the undelivered items and whether there were other vendors that could provide the undelivered items.

The consideration received was allocated among the separate units of accounting using the relative selling price method, and the applicable revenue recognition criteria were applied to each of the separate units.

We determined the estimated selling price for deliverables using vendor-specific objective evidence ("VSOE") of selling price, if available, third-party evidence ("TPE") of selling price if VSOE was not available, or best estimate of selling price ("BESP") if neither VSOE nor TPE was available.

Up-Front License Fees prior to January 1, 2018

When management believed the license to its intellectual property had stand-alone value, we generally recognized revenue attributed to the license upon delivery. When management believed the license to its intellectual property did not have stand-alone value from the other deliverables to be provided in the arrangement, it was combined with other deliverables and the revenue of the combined unit of accounting was recorded based on the method appropriate for the last delivered item.

Milestones prior to January 1, 2018

At the inception of each arrangement that included pre-commercial milestone payments, we evaluated whether each pre-commercial milestone was substantive, in accordance with ASU No. 2010-17, *Revenue Recognition—Milestone Method* ("ASU 2010-17"), prior to the adoption of ASC 606. This evaluation included an assessment of whether (a) the consideration was commensurate with either (1) the entity's performance to achieve the milestone, or (2) the enhancement of the value of the delivered item(s) as a result of a specific outcome resulting from the entity's performance to achieve the milestone, (b) the consideration relates solely to past performance and (c) the consideration is reasonable relative to all of the deliverables and payment terms within the arrangement. We evaluated factors such as the scientific, clinical, regulatory, commercial and other risks that must be overcome to achieve the respective milestone, the level of effort and investment required and whether the milestone consideration is reasonable relative to all deliverables and payment terms in the arrangement in making this assessment. At December 31, 2017, we had no pre-commercial milestones that were deemed substantive.

Commercial milestones were accounted for as royalties and are recorded as revenue upon achievement of the milestone, assuming all other revenue recognition criteria are met.

Net Profit or Net Loss Sharing prior to January 1, 2018

In accordance with ASC 808, and ASC 605-45, *Principal Agent Considerations* , we considered the nature and contractual terms of the arrangement and the nature of our business operations to determine the classification of the transactions under our collaboration agreements. We recorded revenue transactions gross in the consolidated statements of operations if it is deemed the principal in the transaction, which includes being the primary obligor and having the risks and rewards of ownership.

We recognized our share of the pre-tax commercial net profit or net loss generated from the sales of LINZESS in the U.S. in the period the product sales are reported by Allergan and related cost of goods sold and selling, general and administrative expenses are incurred by us and our collaboration partner. These amounts were partially determined based on amounts provided by Allergan and involve the use of estimates and judgments, such as product sales allowances and accruals related to prompt payment discounts, chargebacks, governmental and contractual rebates, wholesaler fees, product returns, and co-payment assistance costs, which could be adjusted based on actual results. For the periods covered in the consolidated financial statements presented, there have been no material changes to prior period estimates of revenues, cost of goods sold or selling, general and administrative expenses associated with the sales of LINZESS in the U.S.

We record our share of the net profits or net losses from the sales of LINZESS in the U.S. on a net basis and present the settlement payments to and from Allergan as collaboration expense or collaborative arrangements revenue, as applicable, as we are not the primary obligor and do not have the risks and rewards of ownership in the collaboration agreement with Allergan for North America. We and Allergan settle the cost sharing quarterly, such that our

consolidated statements of operations reflect 50% of the pre-tax net profit or loss generated from sales of LINZESS in the U.S.

Royalties on Product Sales prior to January 1, 2018

We received royalty revenues under certain of the Company's license or collaboration agreements. We recorded these revenues as earned.

Product Revenue, Net prior to January 1, 2018

As noted above, net product revenue is derived from sales of the Lesinurad Products in the U.S.

We recognized net product revenue from sales of the Lesinurad Products in accordance with ASC 605, when persuasive evidence of an arrangement existed, delivery had occurred and title of the product and associated risk of loss had passed to the customer, the price was fixed or determinable, and collection from the customer was reasonably assured. ASC 605 required, among other criteria, that future returns could be reasonably estimated in order to recognize revenue.

We began commercializing ZURAMPIC in October 2016 and DUZALLO in October 2017 in the U.S. Initially, upon the product launch of each of the Lesinurad Products, we determined that it was not able to reliably make certain estimates, including returns, necessary to recognize product revenue upon delivery to Distributors. As a result, through September 30, 2017, we recorded net product revenue for the Lesinurad Products using a deferred revenue recognition model (sell-through). Under the deferred revenue model, we did not recognize revenue until the respective product was prescribed to an end-user. Accordingly, we recognized net product revenue when the Lesinurad Products were prescribed to the end-user, using estimated prescription demand and pharmacy demand from third party sources and the Company's analysis of third party market research data, as well as other third-party information through September 30, 2017.

During the three months ended December 31, 2017, we concluded we had sufficient volume of historical activity and visibility into the distribution channel, in order to reasonably make all estimates required under ASC 605 to recognize product revenue upon delivery to the Distributor. During the three months and year ended December 31, 2017, product revenue was recognized upon delivery of the Lesinurad Products to the Distributors. We evaluated the creditworthiness of each of its Distributors to determine whether revenue could be recognized upon delivery, subject to satisfaction of the other requirements, or whether recognition was required to be delayed until receipt of payment. In order to conclude that the price is fixed or determinable, we must be able to (i) calculate our gross product revenue from the sales to Distributors and (ii) reasonably estimate our net product revenue. We calculated gross product revenue based on the wholesale acquisition cost that the Company charged its Distributors for ZURAMPIC and DUZALLO. We estimated its net product revenue by deducting from our gross product revenue (i) trade discounts and allowances, such as invoice discounts for prompt payment and distributor fees, (ii) estimated government and private payor rebates, chargebacks and discounts, such as Medicaid reimbursements, (iii) reserves for expected product returns and (iv) estimated costs of incentives offered to certain indirect customers including patients. These estimates could be adjusted based on actual results in the period such variances become known.

Other

We supply linaclotide finished drug product, API and development materials for certain of our partners.

We recognized revenue on linaclotide finished drug product, API and development materials when the material had passed all quality testing required for collaborator acceptance, delivery had occurred, title and risk of loss had transferred to the partner, the price was fixed or determinable, and collection was reasonably assured.

The agreements above are more fully described in Note 5, *Collaboration, License, Co-promotion and Other Commercial Agreements,* in the accompanying notes to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Research and Development Expense

All research and development expenses are expensed as incurred. We defer and capitalize nonrefundable advance payments we make for research and development activities until the related goods are received or the related services are performed.

Research and development expenses are comprised of costs incurred in performing research and development activities, including salary, benefits and other employee-related expenses; share-based compensation expense; laboratory supplies and other direct expenses; facilities expenses; overhead expenses; third-party contractual costs relating to nonclinical studies and clinical trial activities and related contract manufacturing expenses, development of manufacturing processes and regulatory registration of third-party manufacturing facilities; licensing fees for our product candidates; and other outside expenses.

Clinical trial expenses include expenses associated with contract research organizations, or CROs. The invoicing from CROs for services rendered can lag several months. We accrue the cost of services rendered in connection with CRO activities based on our estimate of site management, monitoring costs, project management costs, and investigator fees. We maintain regular communication with our CRO vendors to gauge the reasonableness of our estimates. Differences between actual clinical trial expenses and estimated clinical trial expenses recorded have not been material and are adjusted for in the period in which they become known. However, if we incorrectly estimate activity levels associated with the CRO services at a given point in time, we could be required to record material adjustments in future periods. Under our Allergan and AstraZeneca linaclotide collaboration agreements for the U.S. and China, Hong Kong and Macau, respectively, we are reimbursed for certain research and development expenses and we net these reimbursements against our research and development expenses as incurred. Amounts owed to Allergan or AstraZeneca for such territories are recorded as incremental research and development expense. Nonrefundable advance payments for research and development activities are capitalized and expensed over the related service period or as goods are received. We have committed significant resources into the research and development of our product candidates and intend to continue to do so for the foreseeable future.

Share-Based Compensation Expense

We make certain assumptions in order to value and record expense associated with awards made under our share-based compensation arrangements. We estimate the fair value of the stock option awards for employees and non-employees using the Black-Scholes option-pricing model. The fair value of our restricted stock unit, or RSU, awards is based on the market value of our Class A common stock on the date of grant. Determining the fair value of share-based awards requires the use of highly subjective assumptions, including expected term of the award and expected stock price volatility. For certain of these awards, we determine the appropriate amount to expense based on the anticipated achievement of performance targets, which requires judgment, including forecasting the achievement of future specified targets. Changes in these assumptions may lead to variability with respect to the amount of expense we recognize in connection with share-based payments.

We recognize compensation expense on a straight-line basis over the requisite service period based upon stock options that are ultimately expected to vest, and accordingly, such compensation expense is adjusted by the amount of estimated forfeitures. We estimate forfeitures over the requisite service period when recognizing share-based compensation expense based on historical rates and forward-looking factors; these estimates are adjusted to the extent that actual forfeitures differ, or are expected to materially differ, from our estimates.

We have also granted time-accelerated stock options with terms that allow the acceleration in vesting of the stock options upon the achievement of performance-based milestones specified in the grants. Share-based compensation expense associated with these time-accelerated stock options is recognized over the requisite service period of the awards or the implied service period, if shorter.

While the assumptions used to calculate and account for share-based compensation awards represent management's best estimates, these estimates involve inherent uncertainties and the application of management's judgment. As a result, if revisions are made to our underlying assumptions and estimates, our share-based compensation expense could vary significantly from period to period.

Contingent Consideration

In accordance with ASC 805, we recognize assets acquired and liabilities assumed in business combinations, including contingent liabilities and non-controlling interest in the acquiree based on the fair value estimates as of the date of acquisition. The consideration for our business acquisitions include future payments that are contingent upon the occurrence of a particular event or events. The obligations for such contingent consideration payments are recorded at fair value on the acquisition date. The contingent consideration obligations are then evaluated each reporting period. Changes in the fair value of contingent consideration obligations, other than changes due to payments, are recognized as a (gain) loss on fair value remeasurement of contingent consideration in our consolidated statements of operations. Adjustments are recorded when there are changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to our credit risk, which is based on the estimated cost of debt for market participants. During the year ended December 31, 2018, we decreased certain of our net cash outflow projections associated with the exit of the Lesinurad License, which resulted in an approximately $31.0 million decrease to the contingent consideration liability. For further details related to contingent consideration, refer to Note 4, *Goodwill and Intangible Assets* and Note 6, *Fair Value of Financial Instruments* to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Results of Operations

The following discussion summarizes the key factors our management believes are necessary for an understanding of our consolidated financial statements.

	Year Ended December 31,		
	2018	2017	2016
	(in thousands)		
Revenues:			
Collaborative arrangements revenue	$ 272,839	$ 265,533	$ 263,923
Product revenue, net	3,445	3,061	109
Sale of active pharmaceutical ingredient	70,355	29,682	9,925
Total revenues	346,639	298,276	273,957
Cost and expenses:			
Cost of revenues, excluding amortization of acquired intangible assets	32,751	19,097	1,868
Write-down of commercial supply and inventory to net realizable value and loss on non-cancellable purchase commitments	247	309	374
Research and development	166,503	148,228	139,492
Selling, general and administrative	241,291	233,123	173,281
Amortization of acquired intangible assets	8,111	6,214	981
(Gain) loss on fair value remeasurement of contingent consideration	(31,045)	(31,310)	9,831
Restructuring expenses	15,879	—	—
Impairment of intangible assets	151,794	—	—
Total cost and expenses	585,531	375,661	325,827
Loss from operations	(238,892)	(77,385)	(51,870)
Other (expense) income:			
Interest expense	(37,724)	(36,370)	(39,153)
Interest and investment income	2,991	2,111	1,169
(Loss) gain on derivatives	(8,743)	(3,284)	8,146
Loss on extinguishment of debt	—	(2,009)	—
Other expense, net	(43,476)	(39,552)	(29,838)
Net loss	$ (282,368)	$ (116,937)	$ (81,708)

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Revenues

	Year Ended December 31,		Change	
	2018	2017	$	%
	(dollars in thousands)			
Revenues:				
Collaborative arrangements revenue	$272,839	$265,533	$ 7,306	3 %
Product revenue, net	3,445	3,061	384	13 %
Sale of active pharmaceutical ingredient	70,355	29,682	40,673	137 %
Total revenues	346,639	298,276	48,363	16 %

Collaborative Arrangements Revenue. The increase in revenue from collaborative arrangements of approximately $7.3 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was primarily related to an approximately $36.2 million increase in our share of the net profits from the sale of LINZESS in the U.S. driven by increased prescription demand; an approximately $1.5 million increase in revenue related to VIBERZI co-promotion activities; an approximately $1.3 million increase due to the recognition of the VIBERZI sales-based milestone; and an approximately $1.0 million increase in revenue related to royalty payments received in relation to all partner activities. The increases were partially offset by an adjustment to our share of the net profits from the sale of LINZESS in the U.S. of approximately $29.9 million related to a change in estimate of gross-to-net sales reserves and allowances, primarily associated with governmental and contractual rebates; and approximately $2.5 million decrease

attributable to the decrease in revenue under the Cologuard Co-Promotion Agreement with Exact Sciences due to the end of the royalty period.

Product revenue, net. The increase in net product revenue of approximately $0.4 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was primarily due to net product sales of DUZALLO in the U.S. in 2018. We began commercializing DUZALLO in September 2017.

Sale of active pharmaceutical ingredient. The increase in sale of API of approximately $40.7 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was primarily due to increased shipments of linaclotide API to Astellas for Japan. In March 2017, Astellas began commercializing LINZESS for the treatment of adults with IBS-C in Japan, and in September 2018, Astellas began commercializing LINZESS for the treatment of adults with chronic constipation in Japan.

Cost and Expenses

	Year Ended December 31,		Change	
	2018	2017	$	%
	(dollars in thousands)			
Cost and expenses:				
Cost of revenues, excluding amortization of acquired intangible assets	$ 32,751	$ 19,097	$ 13,654	71 %
Write-down of commercial supply and inventory to net realizable value and loss on non-cancellable purchase commitments	247	309	(62)	(20)%
Research and development	166,503	148,228	18,275	12 %
Selling, general and administrative	241,291	233,123	8,168	4 %
Amortization of acquired intangible assets	8,111	6,214	1,897	31 %
Gain on fair value remeasurement of contingent consideration	(31,045)	(31,310)	265	(1)%
Restructuring expenses	15,879	—	15,879	100 %
Impairment of intangible assets	151,794	—	151,794	100 %
Total cost and expenses	$ 585,531	$ 375,661	$ 209,870	56 %

Cost of Revenues, excluding amortization of acquired intangible assets. The increase of approximately $13.7 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was primarily related to an increase of approximately $15.2 million due to an increase in linaclotide API sales to Astellas in Japan, offset by approximately $1.5 million of one-time period related costs incurred during the year ended December 31, 2017.

Write-down of commercial supply and inventory to net realizable value and loss on non-cancelable purchase commitments. The insignificant decrease in write-down of lesinurad commercial supply and loss on non-cancelable purchase commitments for the year ended December 31, 2018 compared to the year ended December 31, 2017 was driven by write-downs of inventory, overhead, and purchase commitments of approximately $2.8 million primarily due to revisions to the lesinurad commercial supply demand forecasts as a result of exiting the lesinurad franchise and additional insignificant adjustments related to linaclotide inventory; offset by an approximately $2.5 million settlement related to linaclotide excess non-cancelable purchase commitment accruals that were assigned to Allergan during the year ended December 31, 2018.

Research and Development Expense. The increase in research and development expense of approximately $18.3 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was primarily related to an increase of approximately $17.5 million in research costs related to our early-stage pipeline candidates; an increase of approximately $7.5 million in compensation, benefits and other employee-related expenses; and an increase of approximately $2.8 million in operating costs, including facilities. These increases were partially offset by a decrease of $9.5 million in costs related to lesinurad development and transition services agreement expenses with AstraZeneca, which ended in 2017.

Selling, General and Administrative Expense. Selling, general and administrative expenses increased approximately $8.2 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 primarily as a result of an approximately $8.5 million increase in legal and consulting costs associated with the Company's intent to separate into two independent publicly traded companies; an approximately $5.9 million increase in costs associated with professional services such as temporary support and separation-related costs; an approximately $3.8 million increase in legal and consulting costs associated with the proxy statement; and an approximately $6.0 million increase in other legal costs. These increases were partially offset by a decrease of an approximately $5.4 million

in transitional support service costs which ended in 2017 associated with the Lesinurad Transaction; an approximately $4.2 million decrease in costs associated with product samples; an approximately $2.5 million decrease in costs related to facilities and operating costs; an approximately $1.9 million decrease in cost as a result of gains recorded in association with the disposal of the salesforce fleet vehicles; an approximately $0.9 million decrease in costs related to sales and marketing programs; and an approximately $0.7 million decrease in compensation, benefits, and employee-related expenses.

Amortization of Acquired Intangible Assets. The increase in amortization of acquired intangible assets expense of approximately $1.9 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was primarily due to the amortization of the DUZALLO intangible asset which began amortizing in August 2017 upon FDA approval. During the year ended December 31, 2018, the ZURAMPIC and DUZALLO intangible assets were written down and considered fully impaired.

Gain on Fair Value remeasurement of contingent consideration. Fair value remeasurement of contingent consideration includes significant estimates related to probability weighted net cash outflow projections, discounted using a yield curve equivalent to our credit risk which estimates the probability weighted analysis of expected future milestone and royalty payments based on net sales to be made to AstraZeneca in connection with the Lesinurad Transaction. Changes to these inputs are re-evaluated each reporting period. The decrease in the gain on fair value of the contingent consideration obligation of approximately $0.3 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was due to revised projected revenue assumptions associated with the sales of ZURAMPIC and DUZALLO. During the three months ended September 30, 2018, the Company reduced its projected revenue assumptions associated with the sales of ZURAMPIC and DUZALLO and delivered to AstraZeneca a notice of termination of the Lesinurad License.

Restructuring Expenses. The increase in restructuring expenses of approximately $15.9 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was due to approximately $8.3 million of workforce reduction and contract termination costs incurred during the year ended December 31, 2018 associated with the exit of the Lesinurad License; approximately $5.2 million of costs related to the workforce reduction in June 2018 associated with the determination of the initial organizational designs of the two new businesses as a result of our intent to separate into two independent, publicly traded companies; and approximately $2.4 million of costs incurred with the reduction in field-based workforce in January 2018 associated with an initiative to evaluate the optimal mix of investments for the lesinurad franchise.

Impairment of Intangible Assets. The increase in the impairment of intangible assets of approximately $151.8 million for the year ended December 31, 2018 compared to the year ended December 31, 2017 was due to the full asset impairment of the ZURAMPIC and DUZALLO intangible assets as a result of revised net cash flow assumptions and the exit of the Lesinurad License.

Other (Expense) Income, Net

	Year Ended December 31,		Change	
	2018	2017	$	%
	(dollars in thousands)			
Other (expense) income:				
Interest expense	$(37,724)	$(36,370)	$(1,354)	4 %
Interest and investment income	2,991	2,111	880	42 %
Loss on derivatives	(8,743)	(3,284)	(5,459)	166 %
Loss on extinguishment of debt	—	(2,009)	2,009	(100)%
Total other expense, net	$(43,476)	$(39,552)	$(3,924)	10 %

Interest Expense. Interest expense increased by approximately $1.4 million during the year ended December 31, 2018 compared to the year ended December 31, 2017, mainly due to an increase of approximately $1.5 million in interest expense associated with the 2022 Notes.

Interest and investment income. Interest and investment income increased approximately $0.9 million for the year ended December 31, 2018 compared to the year ended December 31, 2017, mainly due to higher returns on investment securities in 2018, and partially offset by lower average investment balances in 2018 versus 2017.

Loss on derivatives. For the year ended December 31, 2018 we recorded a loss on derivatives of approximately $8.7 million resulting from an approximately $67.1 million decrease in fair value of the Convertible Note Hedges and an approximately $58.4 million increase in the fair value of the Note Hedge Warrants. For the year ended December 31, 2017 we recorded a loss on derivatives of approximately $3.3 million resulting from an approximately $24.3 million decrease in fair value of the Convertible Note Hedges and an approximately $21.0 million increase in the fair value of the Note Hedge Warrants.

Loss on extinguishment of debt. Loss on extinguishment of debt was approximately $2.0 million for the year ended December 31, 2017 due to the write-off of the remaining unamortized debt issuance costs on the PhaRMA Notes as part of the redemption in January 2017.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Revenue

	Year Ended December 31,		Change	
	2017	2016	$	%
	(dollars in thousands)			
Revenues:				
Collaborative arrangements revenue	$265,533	$263,923	$ 1,610	1 %
Product revenue, net	3,061	109	2,952	2,708 %
Sale of active pharmaceutical ingredient	29,682	9,925	19,757	199 %
Total revenues	298,276	273,957	24,319	9 %

Collaborative Arrangements Revenue. The increase in revenue from collaborative arrangements of approximately $1.6 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 was primarily related to an approximately $40.2 million increase in our share of the net profits from the sale of LINZESS in the U.S.; an approximately $1.8 million increase in royalty revenue based on sales of linaclotide in our partnered territories and other related royalties; and an approximately $0.2 million increase in drug product sales related to our collaboration agreement with AstraZeneca. The increases were partially offset by an approximately $39.0 million decrease attributable to the recognition of up-front payments and development milestones achieved in 2016 under our agreement with Astellas; an approximately $1.0 million decrease in revenue related to the Cologuard Co-Promotion Agreement which was terminated in 2017; an approximately $0.4 million decrease in revenue related to our license and co-promotion collaboration agreement with AstraZeneca for linaclotide; and an approximately $0.2 million decrease from our co-promotion agreement with Allergan for VIBERZI in the U.S.

Product revenue, net. The increase in net product revenue of approximately $3.0 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 was primarily related to an approximately $2.4 million increase in net product sales of ZURAMPIC in the U.S.; and an approximately $0.6 million increase from commercializing DUZALLO in the U.S. in October 2017.

Sale of active pharmaceutical ingredient. The increase in revenue from sale of API of approximately $19.8 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 was primarily related to an increase of approximately $24.2 million from shipments of linaclotide API to Astellas for Japan, and was partially offset by an approximately $4.5 million decrease in shipments of linaclotide API to Allergan for ex-US territories compared to 2016.

Cost and Expenses

	Year Ended December 31,		Change	
	2017	2016	$	%
	(dollars in thousands)			
Cost and expenses:				
Cost of revenues, excluding amortization of acquired intangible assets	$ 19,097	$ 1,868	$ 17,229	922 %
Write-down of commercial supply and inventory to net realizable value and loss on non-cancellable purchase commitments	309	374	(65)	(17)%
Research and development	148,228	139,492	8,736	6 %
Selling, general and administrative	233,123	173,281	59,842	35 %
Amortization of acquired intangible assets	6,214	981	5,233	533 %
(Gain) loss on fair value remeasurement of contingent consideration	(31,310)	9,831	(41,141)	(418)%
Total cost and expenses	$ 375,661	$ 325,827	$ 49,834	15 %

Cost of Revenues, excluding amortization of acquired intangible assets. The increase in cost of revenue of approximately $17.2 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 was primarily related to an increase of approximately $15.2 million due to higher sales of linaclotide API to our partners, and approximately $2.0 million in costs associated with ZURAMPIC and DUZALLO product sales and lesinurad period costs related to freight, packaging, stability and quality testing, and customer acquisition. In October 2016, we began commercializing ZURAMPIC in the U.S. and in October 2017, we began commercializing DUZALLO in the U.S.

Write-down of commercial supply and inventory to net realizable value and loss on non-cancelable purchase commitments. The insignificant decrease in write-down of commercial supply and inventory for the year ended December 31, 2017 compared to the year ended December 31, 2016, was related to the write-down of lesinurad commercial supply. For the year ended December 31, 2016, we recorded a write-down of $0.4 million related to ZURAMPIC prepaid commercial supply as a result of revised demand forecasts. For the year ended December 31, 2017, we recorded a write-down of $0.3 million related to ZURAMPIC prepaid commercial supply and excess non-cancelable ZURAMPIC commercial supply purchase commitments as a result of revised demand forecasts.

Research and Development Expense. The increase in research and development expense of approximately $8.7 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 was primarily related to an increase of approximately $8.9 million in research costs related to our early stage pipeline candidates; an increase of approximately $6.0 million in compensation, benefits and other employee related expenses primarily associated with increased headcount; and an increase of approximately $2.2 million in professional services, including consulting and search firm fees. The increases were partially offset by a decrease of approximately $3.6 million in costs related to lesinurad development and transition services agreement expenses with AstraZeneca; a decrease of approximately $2.6 million in external costs related to the development of linaclotide, net of reimbursements, related to our linaclotide collaboration with Allergan for North America; and a decrease of approximately $2.2 million in facility and operating costs, such as rent and amortization of leasehold improvements.

Selling, General and Administrative Expense. Selling, general and administrative expenses increased approximately $59.8 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 primarily as a result of an increase in our workforce and infrastructure expenses due to the launch and commercialization of the lesinurad products in the U.S. This increase includes an approximately $25.8 million increase in compensation, benefits and other employee-related expenses associated with the increased headcount primarily in our field sales force; an approximately $11.7 million increase in costs associated with selling expenses and marketing programs; an approximately $9.6 million increase in external consulting and contractor costs, legal services, and other professional service costs; an approximately $7.8 million increase in costs for post-marketing requirements for lesinurad; an approximately $2.2 million increase in costs associated with transitional support services related to the Lesinurad Transaction; an approximately $1.3 million increase in expenses related to the write-off of excess non-cancelable lesinurad sample purchase commitments pursuant to our forecasts, as a result of a reduction in near-term forecasted demand; an approximately $0.6 million increase related to a loss on disposal of assets; and an approximately $0.4 million increase in expenses related to the write-off of excess prepaid lesinurad samples.

Amortization of Acquired Intangible Assets. The increase in amortization of acquired intangible asset expense of approximately $5.2 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 was due to the Lesinurad Transaction that closed in June 2016, in which we acquired an exclusive license in the U.S. to, among other things, the approved product ZURAMPIC. In addition, the intangible asset related to DUZALLO began amortizing upon approval by the FDA in August 2017.

(Gain) loss on Fair Value remeasurement of contingent consideration. The decrease in the fair value of the contingent consideration liability of approximately $41.1 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 was due to a change in assumptions. Adjustments are recorded when there are changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to our credit risk, which is based on the estimated cost of debt for market participants. During the year ended December 31, 2017, we decreased our ZURAMPIC and DUZALLO revenue projections. Accordingly, the expected estimated future royalty and milestone payments to AstraZeneca decreased, resulting in an approximately $31.3 million decrease to the contingent consideration liability. In addition, the remaining change in the contingent consideration liability decrease was primarily due to the passage of time.

Other (Expense) Income, Net

	Year Ended December 31,		Change	
	2017	2016	$	%
	(dollars in thousands)			
Other (expense) income:				
Interest expense	$(36,370)	$(39,153)	$ 2,783	(7)%
Interest and investment income	2,111	1,169	942	81 %
(Loss) gain on derivatives	(3,284)	8,146	(11,430)	(140)%
Loss on extinguishment of debt	(2,009)	—	(2,009)	(100)%
Total other expense, net	$(39,552)	$(29,838)	$ (9,714)	33 %

Interest Expense. Interest expense decreased approximately $2.8 million for the year ended December 31, 2017 compared to the year ended December 31, 2016, mainly driven by a decrease of approximately $17.7 million in interest expense associated with the redemption of the PhaRMA Notes, partially offset by an increase of approximately $13.6 million and $1.3 million in interest expense associated with the 2026 Notes and 2022 Notes, respectively.

Interest and investment income. Interest and investment income increased approximately $0.9 million for the year ended December 31, 2017 compared to the year ended December 31, 2016, mainly due to an increase in the higher yield return on investment securities in 2017.

(Loss) gain on derivatives. For the year ended December 31, 2017 we recorded a loss on derivatives of approximately $3.3 million resulting from an approximately $24.3 million decrease in fair value of the Convertible Note Hedges and an approximately $21.0 million increase in the fair value of the Note Hedge Warrants. For the year ended December 31, 2016 we recorded a gain on derivatives of approximately $8.1 million resulting from an approximately $46.1 million increase in fair value of the Convertible Note Hedges and an approximately $38.0 million decrease in the fair value of the Note Hedge Warrants.

Loss on extinguishment of debt. Loss on extinguishment of debt was approximately $2.0 million for the year ended December 31, 2017 due to the write-off of the remaining unamortized debt issuance costs on the PhaRMA Notes as part of the redemption in January 2017.

Liquidity and Capital Resources

We have incurred losses since our inception in 1998 and, as of December 31, 2018, we had an accumulated deficit of approximately $ 1.6 billion. We have financed our operations to date primarily through both the private sale of our preferred stock and the public sale of our common stock, including approximately $203.2 million of net proceeds from our initial public offering, or IPO, in February 2010, and approximately $413.4 million of net proceeds from our follow on public offerings; payments received under our strategic collaborative arrangements, including up-front and milestone payments, royalties and our share of net profits, as well as reimbursement of certain expenses; and debt financings, including approximately $11.2 million of net proceeds from the private placement of our 2026 Notes,

approximately $167.3 million of net proceeds from the private placement of our PhaRMA Notes in January 2013 (which we redeemed, in full, in connection with the funding in January 2017 of the 2026 Notes), and approximately $324.0 million of net proceeds from the private placement of our 2022 Notes in June 2015. At December 31, 2018, we had approximately $ 173.2 million of unrestricted cash and cash equivalents. Our cash equivalents include amounts held in money market funds and repurchase agreements. We invest cash in excess of immediate requirements in accordance with our investment policy, which limits the amounts we may invest in certain types of investments and requires all investments held by us to be at least A- rated, with a remaining maturity when purchased of less than twenty-four months, so as to primarily achieve liquidity and capital preservation.

During the year ended December 31, 2018, our balances of cash, cash equivalents and available-for-sale securities decreased approximately $ 48.2 million. This decrease is primarily due to approximately $ 70.9 million of cash used to operate our business, including payments related to, among other things, research and development and selling, general and administrative expenses as we continued to invest in our research pipeline and support the continued commercialization of LINZESS in the U.S. We also invested approximately $ 8.6 million in capital expenditures and made payments of approximately $1 .8 million on capital lease obligations. These cash outflows were partially offset by approximately $ 32.1 million in proceeds from the exercise of stock options and the issuance of shares pursuant to our employee stock purchase plan.

Cash Flows From Operating Activities

Net cash used in operating activities totaled approximately $ 70.9 million for the year ended December 31, 2018. The primary use of cash was our net loss of approximately $ 282.4 million, partially offset by non-cash items of approximately $203.9 million and changes in assets and liabilities of approximately $ 7.6 million, primarily resulting from an increase in accounts receivable and related party accounts receivable, a decrease in prepaid expenses and other current assets, a decrease in inventory and other assets, an increase in accounts payable and related party accounts payable and accrued expenses, an increase in accrued research and development costs, and an increase in deferred rent. Non-cash items included approximately $ 151.8 million of intangible asset impairment related to the termination of the lesinurad license agreement, approximately $ 44.0 million in share-based compensation expense, approximately $ 17.6 million in non-cash interest expense, an approximate $ 8.7 million net decrease due to the change in fair value of the Convertible Note Hedges and Note Hedge Warrants, approximately $ 8.1 million in amortization of acquired intangible assets, and approximately $6.1 million in depreciation and amortization expense of property and equipment; partially offset by an approximately $ 31.0 million due to the non-cash change in fair value of contingent consideration, and approximately $ 1.9 million due to the gain on disposal of property and equipment.

Net cash used in operating activities totaled approximately $99.6 million for the year ended December 31, 2017. The primary uses of cash were our net loss of approximately $116.9 million and changes in assets and liabilities of approximately $21.8 million resulting primarily from an decrease in related party accounts receivable, an increase in restricted cash associated with the release of the line of credit related to our lease amendment in 2017, a decrease in accounts payable, related party accounts payable, and accrued expenses, an increase in prepaid expenses and other assets, an increase in inventory and other assets, a decrease in deferred rent and an increase in accrued research and development costs. These uses of cash were primarily offset by non-cash items of approximately $39.2 million, including approximately $33.8 million in share-based compensation expense, approximately $16.1 million in non-cash interest expense, approximately $8.4 million in depreciation and amortization expense of property and equipment, approximately $6.2 million in amortization of acquired intangible assets, an approximately $3.3 million increase due to the change in fair value of the Convertible Note Hedges and Note Hedge Warrants, approximately $2.0 million loss on extinguishment of debt, approximately $1.3 million in write-down of excess non-cancelable product sample purchase commitment, and approximately $0.7 million in loss on disposal of property and equipment; partially offset by an approximately $31.3 million due to the non-cash change in fair value of contingent consideration, and approximately $1.6 million due to the gain on facility subleases.

Net cash used in operating activities totaled approximately $25.4 million for the year ended December 31, 2016. The primary uses of cash were our net loss of approximately $81.7 million and changes in assets and liabilities of approximately $5.0 million resulting primarily from an increase in related party accounts receivable principally attributable to higher amounts due from Allergan as a result of increased profits on the sale of LINZESS in the U.S., a decrease in restricted cash associated with our salesforce vehicle fleet, an increase in accounts payable, related party accounts payable and accrued expenses, an increase in prepaid expenses and other assets, a decrease in deferred revenue, a decrease in deferred rent and an increase in accrued research and development costs. These uses of cash were primarily

offset by non-cash items of approximately $61.3 million, including approximately $29.2 million in share-based compensation expense, approximately $14.8 million in non-cash interest expense, approximately $10.3 million in depreciation and amortization expense of property and equipment, approximately $9.8 million due to the non-cash change in fair value of contingent consideration, approximately $3.5 million due to the loss on facility subleases, approximately $1.0 million in amortization of acquired assets, approximately $0.7 million in accretion of discounts and premiums on available-for-sale securities, and approximately $0.4 million in write-down of prepaid inventory; partially offset by an approximately $8.1 million due to the change in fair value of the Convertible Note Hedges and Note Hedge Warrants, and approximately $0.2 million in gain on disposal of property and equipment.

Cash Flows From Investing Activities

Cash provided by investing activities for the year ended December 31, 2018 totaled approximately $ 88.9 million and resulted primarily from maturities of approximately $ 99.2 million of available-for-sale securities, and approximately $1.6 million in proceeds from the sale of property and equipment. This was partially offset by the purchase of approximately $ 8.6 million of property and equipment, primarily laboratory equipment as well as hardware and software related to our information technology infrastructure, and the purchase of approximately $ 3.2 million of available-for-sale securities.

Cash provided by investing activities for the year ended December 31, 2017 totaled approximately $151.5 million and resulted primarily from the sales and maturities of approximately $346.9 million of available-for-sale securities, and an insignificant amount of proceeds from the sale of property and equipment. This was partially offset by the purchase of approximately $191.4 million of available-for-sale securities and the purchase of approximately $4.2 million of property and equipment, primarily laboratory equipment as well as hardware and software related to our information technology infrastructure.

Cash used in investing activities for the year ended December 31, 2016 totaled approximately $177.7 million and resulted primarily from the costs associated with the Lesinurad License consisting of an up-front payment of $100.0 million, the purchase of approximately $311.1 million of available-for-sale securities and the purchase of approximately $4.2 million of property and equipment, primarily laboratory equipment as well as hardware and software related to our information technology infrastructure. This was partially offset by the sales and maturities of approximately $237.4 million of available-for-sale securities, and approximately $0.2 million of proceeds from the sale of property and equipment.

Cash Flows From Financing Activities

Cash provided by financing activities for the year ended December 31, 2018 totaled approximately $ 30.1 million and resulted primarily from approximately $ 32.1 million in cash provided by stock option exercises and the issuance of shares under our employee stock purchase plan, partially offset by approximately $ 1.8 million in cash used for payments on our capital leases.

Cash provided by financing activities for the year ended December 31, 2017 totaled approximately $19.8 million and resulted primarily from approximately $146.3 in proceeds from issuance of the 2026 Notes, and approximately $26.4 million in cash provided by stock option exercises and the issuance of shares under our employee stock purchase plan, partially offset by approximately $134.3 million in cash paid to redeem our outstanding PhaRMA Notes, approximately $15.1 million in cash used for payments on contingent purchase consideration, including a milestone payment to AstraZeneca for the approval of DUZALLO, approximately $3.2 million in cash used for payments on our capital leases, and approximately $0.2 million in costs associated with the issuance of the 2026 Notes.

Cash used in financing activities for the year ended December 31, 2016 totaled approximately $4.2 million and resulted primarily from approximately $26.9 million in cash used for principal payments on our outstanding PhaRMA Notes, approximately $1.9 million in cash used for payments on our capital leases, and approximately $0.2 million in costs associated with the issuance of the 2026 Notes, partially offset by approximately $24.8 million in cash provided by stock option exercises and the issuance of shares under our employee stock purchase plan.

Funding Requirements

We began commercializing LINZESS in the U.S. with our collaboration partner, Allergan, in the fourth quarter of 2012, and we currently derive substantially all of our revenue from this collaboration. We are also deploying significant resources to advance product opportunities in IBS-C and CIC, abdominal pain associated with IBS and persistent GERD, as well as to fulfill FDA requirements for linaclotide and lesinurad. In addition, prior to the planned separation, we are deploying significant resources to advance product opportunities in diabetic nephropathy, HFpEF and serious and orphan diseases such as sickle cell disease. Our goal is to become cash flow positive, driven by increased revenue generated through sales of LINZESS and linaclotide API and financial discipline. However, we have not achieved positive cash flows from operations to date.

Under our collaboration with Allergan for North America, total net sales of LINZESS in the U.S., as recorded by Allergan, are reduced by commercial costs incurred by each party, and the resulting amount is shared equally between us and Allergan. Additionally, we receive royalties from Allergan based on sales of linaclotide in its licensed territories outside of the U.S. We believe revenues from our LINZESS partnership for the U.S. with Allergan will continue to constitute a significant portion of our total revenue for the foreseeable future and we cannot be certain that such revenues, as well as the revenues from our other commercial activities, will enable us to become cash flow positive, or to do so in the timeframes we expect. We also anticipate that we will continue to incur substantial expenses for the next several years as we further develop and commercialize linaclotide in the U.S., China and other markets, develop and commercialize other products, and continue to invest in our pipeline and potentially other external opportunities. We believe that our cash on hand as of December 31, 2018 will be sufficient to meet our projected operating needs at least through the next twelve months from the issuance of these financial statements.

Our forecast of the period of time through which our financial resources will be adequate to support our operations, including the underlying estimates regarding the costs to develop our product candidates and obtain regulatory approvals and the costs to commercialize linaclotide in the U.S., China and other markets, and develop and commercialize other products, as well as our goal to become cash flow positive, are forward-looking statements that involve risks and uncertainties. Our actual results could vary materially and negatively from these and other forward-looking statements as a result of a number of factors, including the factors discussed in the "Risk Factors" section of this Annual Report on Form 10-K. We have based our estimates on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we currently expect.

Due to the numerous risks and uncertainties associated with the development and commercialization of our product candidates, we are unable to estimate precisely the amounts of capital outlays and operating expenditures necessary to develop, obtain regulatory approval for, and commercialize linaclotide and our other product candidates, in each case, for all of the markets, indications, populations and formulations for which we believe each is suited. Our funding requirements will depend on many factors, including, but not limited to, the following:

- the revenue generated by sales of LINZESS, CONSTELLA, and any other products;
- the rate of progress and cost of our commercialization activities, including the expense we incur in marketing and selling LINZESS and any other products;
- the success of our third-party manufacturing activities;
- the time and costs involved in developing, and obtaining regulatory approvals for, our product candidates, as well as the timing and cost of any post-approval development and regulatory requirements;
- the success of our research and development efforts;
- the emergence of competing or complementary products;
- the costs of filing, prosecuting, defending and enforcing any patent claims and other intellectual property rights;
- the costs associated with the Company's intent to separate into two independent, publicly traded companies;

- the terms and timing of any additional collaborative, licensing or other arrangements that we may establish, including royalties or other payments due or payable under such agreements; and
- the acquisition of businesses, products and technologies and the impact of other strategic transactions, as well as the cost and timing of integrating any such assets into our business operations .

Financing Strategy

We may, from time to time, consider additional funding through a combination of new collaborative arrangements, strategic alliances, and additional equity and debt financings or from other sources. We will continue to manage our capital structure and to consider all financing opportunities, whenever they may occur, that could strengthen our long-term liquidity profile. Any such capital transactions may or may not be similar to transactions in which we have engaged in the past. There can be no assurance that any such financing opportunities will also be available on acceptable terms, if at all.

Contractual Commitments and Obligations

Lease and Commercial Supply Obligations

The following table summarizes our lease and commercial supply obligations at December 31, 2018 (excluding interest, except as otherwise noted):

	Payments Due by Period				
		Less Than			More Than
	Total	1 Year	1 - 3 Years	3 - 5 Years	5 Years
	(in thousands)				
Commercial supply obligations [1]	$ 20,540	$ 5,626	$ 8,722	$ 6,192	$ —
Capital lease obligations [2]	251	90	84	77	—
Operating lease obligations [3]	117,212	18,736	37,175	39,183	22,118
Total contractual obligations	$138,003	$24,452	$45,981	$45,452	$ 22,118

(1) We have multiple commercial supply agreements with contract manufacturing organizations for the purchase of linaclotide finished drug product and API. Two of our API supply agreements for supplying linaclotide API to our collaboration partners outside of North America contain minimum purchase commitments, which are reflected in the table above. As of December 31, 2018, approximately $5.1 million of the commitments included in the table above are recorded as an accrual for excess purchases commitments in our consolidated balance sheet. Approximately $2.5 million of these purchase commitments are short-term. These commitments are more fully described in Note 8, *Inventory* and Note 12, *Commitments and Contingencies* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K. In addition, we and Allergan are jointly obligated to make minimum purchases of linaclotide API for the territories covered by our collaboration with Allergan for North America. Currently, Allergan fulfills all such minimum purchase commitments and, as a result, they are excluded from the table above.

(2) Our commitments for capital lease obligations relate to computer and office equipment.

(3) Our commitments for operating leases relate to our lease of office and laboratory space in Cambridge, Massachusetts and our data storage space in Boston, Massachusetts, as well as leases for certain vehicles within our fleet for our field-based sales force and medical science liaisons.

Notes Payable

In June 2015, we issued approximately $335.7 million of 2.25% Convertible Senior Notes due June 15, 2022. The 2022 Notes are governed by an indenture between us and U.S. Bank National Association, as the trustee, or the Indenture. The 2022 Notes are senior unsecured obligations and bear interest at a rate of 2.25% per year, payable on June 15 and December 15 of each year, which began on December 15, 2015. The 2022 Notes will mature on June 15, 2022, unless earlier converted or repurchased. The initial conversion rate for the 2022 Notes is 60.3209 shares of Class A common stock (subject to adjustment as provided for in the Indenture) per $1,000 principal amount of the 2022

Notes, which is equal to an initial conversion price of approximately $16.58 per share. In addition, to minimize the impact of potential dilution to our common stock upon conversion of the 2022 Notes, we entered into the Convertible Note Hedges covering 20,249,665 shares of our Class A common stock in connection with the 2022 Notes. Concurrently with entering into the Convertible Note Hedges, we sold Note Hedge Warrants to acquire 20,249,665 shares of our Class A common stock at an initial strike price of approximately $21.50 per share, subject to customary anti-dilution adjustments.

The following table summarizes our 2022 Notes obligations at December 31, 2018:

	Payments Due by Period				
	Total	Less Than 1 Year	1 - 3 Years	3 - 5 Years	More Than 5 Years
	(in thousands)				
2022 Notes (including interest)	362,135	7,553	15,106	339,476	—

The 2022 Notes, Convertible Note Hedges and Note Hedge Warrants are more fully described in Note 11, *Notes Payable* , in the accompanying notes to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

In September 2016, we closed a direct private placement, pursuant to which we subsequently issued $150.0 million in aggregate principal amount of 8.375% notes due 2026 on the Funding Date, January 5, 2017. The proceeds from the issuance of the 2026 Notes were used to redeem the outstanding principal balance of the PhaRMA Notes. The 2026 Notes bear an annual interest rate of 8.375%, with interest payable March 15, June 15, September 15 and December 15 of each year, each an 8.375% Payment Date, which began on June 15, 2017. Beginning March 15, 2019, we will began making quarterly payments on the 2026 Notes equal to the greater of (i) 7.5% of net sales of linaclotide in the U.S. for the preceding quarter, or the 8.375% Synthetic Royalty Amount, and (ii) accrued and unpaid interest on the notes, or the 8.375% Required Interest Amount. Principal on the 2026 Notes will be repaid in an amount equal to the 8.375% Synthetic Royalty Amount minus the 8.375% Required Interest Amount, when this is a positive number, until the principal has been paid in full. Given the principal payments on the 2026 Notes are based on the net sales of linaclotide in the U.S., which will vary from quarter to quarter, the 2026 Notes may be repaid prior to September 15, 2026, the final legal maturity date. Since we are unable to reliably estimate the exact timing and amounts of the principal payments, as discussed under “Risk Factors” in Item 1A of this Annual Report on Form 10-K, the related commitments are not included in the table above. This transaction is more fully described in Note 11, *Notes Payable* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Commitments Related to Our Collaboration and License Agreements

Under our collaborative agreements with Allergan for North America and AstraZeneca for China, Hong Kong and Macau, we share with Allergan and AstraZeneca all development and commercialization costs related to linaclotide in the U.S. and for China, Hong Kong and Macau, respectively. The actual amounts that we pay our partners or that partners pay to us will depend on numerous factors outside of our control, including the success of our clinical development efforts with respect to linaclotide, the content and timing of decisions made by the regulators, the reimbursement and competitive landscape around linaclotide and our other product candidates, and other factors described under “Risk Factors” in Item 1A of this Annual Report on Form 10-K.

In addition, we have other collaboration and license agreements that are not individually significant to our business. The Company may be required to pay up to $18.0 million for regulatory milestones, none of which had been paid as of December 31, 2018. Our license and collaboration agreements are more fully described in Note 5, *Collaboration, License, Co-Promotion and Other Commercial Agreements* , in the accompanying notes to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Tax-related Obligations

We exclude liabilities or obligations pertaining to uncertain tax positions from our summary of contractual commitments and obligations as we cannot make a reliable estimate of the period of cash settlement with the respective taxing authorities. As of December 31, 2018, we have approximately $ 38.6 million of uncertain tax positions, and we cannot reasonably estimate the potential adjustment to our net operating loss carryforward. These uncertain tax positions

are more fully described in Note 15, *Income Taxes* , in the accompanying notes to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Other Funding Commitments

As of December 31, 2018, we have several ongoing studies in various clinical trial stages. Our most significant clinical trial expenditures are to CROs. The contracts with CROs generally are cancellable, with notice, at our option and do not have any significant cancellation penalties. These items are not included in the table above.

Off-Balance Sheet Arrangements

We do not have any relationships with unconsolidated entities or financial partnerships, such as entities often referred to as structured finance or special purpose entities, that would have been established for the purpose of facilitating off-balance sheet arrangements (as that term is defined in Item 303(a)(4)(ii) of Regulation S-K) or other contractually narrow or limited purposes. As such, we are not exposed to any financing, liquidity, market or credit risk that could arise if we had engaged in those types of relationships. We enter into guarantees in the ordinary course of business related to the guarantee of our own performance and the performance of our subsidiaries.

New Accounting Pronouncements

For a discussion of new accounting pronouncements refer to Note 2, *Summary of Significant Accounting Policies* , to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Item 7A. ***Quantitative and Qualitative Disclosures about Market Risk***

Interest Rate Risk

We are exposed to market risk related to changes in interest rates. We invest our cash in a variety of financial instruments, principally securities issued by the U.S. government and its agencies and money market instruments. The goals of our investment policy are preservation of capital, fulfillment of liquidity needs and fiduciary control of cash and investments. We also seek to maximize income from our investments without assuming significant risk.

Our primary exposure to market risk is interest income sensitivity, which is affected by changes in the general level of interest rates, particularly because our investments are in short-term marketable securities. Due to the primarily short-term duration of our investment portfolio and the low risk profile of our investments, an immediate 1% change in interest rates would not have a material effect on the fair market value of our portfolio. Accordingly, we would not expect our operating results or cash flows to be affected to any significant degree by the effect of a sudden change in market interest rates on our investment portfolio.

We do not believe our cash, cash equivalents and available-for-sale securities have significant risk of default or illiquidity. While we believe our cash, cash equivalents and available-for-sale securities do not contain excessive risk, we cannot provide absolute assurance that in the future our investments will not be subject to adverse changes in market value. In addition, we maintain significant amounts of cash, cash equivalents and available-for-sale securities at one or more financial institutions that are in excess of federally insured limits. Given the potential instability of financial institutions, we cannot provide assurance that we will not experience losses on these deposits.

Our capital lease obligations, 2026 Notes and 2022 Notes bear interest at a fixed rate and therefore have minimal exposure to changes in interest rates; however, because these interest rates are fixed, we may be paying a higher interest rate, relative to market, in the future if our credit rating improves or other circumstances change.

Equity Price Risk

2022 Notes

Our 2022 Notes include conversion and settlement provisions that are based on the price of our Class A common stock at conversion or at maturity of the 2022 Notes. The amount of cash we may be required to pay is determined by the price of our Class A common stock. The fair value of our 2022 Notes is dependent on the price and

volatility of our Class A common stock and will generally increase or decrease as the market price of our Class A common stock changes.

The 2022 Notes are convertible into Class A common stock at an initial conversion rate of 60.3209 shares of Class A common stock (subject to adjustment as provided for in the Indenture) per $1,000 principal amount of the 2022 Notes, which is equal to an initial conversion price of approximately $16.58 per share. The 2022 Notes will mature on June 15, 2022 unless earlier converted or repurchased. The 2022 Notes bear cash interest at an annual rate of 2.25%, payable on June 15 and December 15 of each year, which began on December 15, 2015. As of December 31, 2018, the fair value of the 2022 Notes was estimated by us to be $315.0 million. The 2022 Notes are more fully described in Note 6, *Fair Value of Financial Instruments* , and Note 11, *Notes Payable* , in the accompanying notes to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Convertible Note Hedge and Warrant Transactions with Respect to 2022 Notes

To minimize the impact of potential dilution to our common stock upon conversion of the 2022 Notes, we entered into Convertible Note Hedges. Concurrently with entering into the Convertible Note Hedges, we entered into warrant transactions whereby we sold Note Hedge Warrants to acquire, subject to customary adjustments, 20,249,665 shares of our Class A common stock at an initial strike price of approximately $21.50 per share, subject to adjustment. The Convertible Note Hedges and Note Hedge Warrants are more fully described in Note 11, *Notes Payable* , in the accompanying notes to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Foreign Currency Risk

We have no significant operations outside the U.S. and we do not expect to be impacted significantly by foreign currency fluctuations.

Effects of Inflation

We do not believe that inflation and changing prices over the years ended December 31, 2018, 2017 and 2016 had a significant impact on our results of operations.

Item 8. ***Financial Statements and Supplementary Data***

Our consolidated financial statements, together with the independent registered public accounting firm report thereon, appear at pages F-1 through F-63, of this Annual Report on Form 10-K.

Item 9. ***Changes in and Disagreements with Accountants on Accounting and Financial Disclosure***

None.

Item 9A. ***Controls and Procedures***

Evaluation of Disclosure Controls and Procedures

As required by Rule 13a-15(b) of the Exchange Act, our management, including our principal executive officer and our principal financial officer, conducted an evaluation as of the end of the period covered by this Annual Report on Form 10-K of the effectiveness of the design and operation of our disclosure controls and procedures. Based on that evaluation, our principal executive officer and principal financial officer concluded that our disclosure controls and procedures are effective at the reasonable assurance level in ensuring that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by us in the reports we file under the Exchange Act is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over our financial reporting. Internal control over financial reporting is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act as the process designed by, or under the supervision of, our Chief Executive Officer and Chief Financial Officer, and effected by our board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of our financial statements for external purposes in accordance with generally accepted accounting principles, and includes those policies and procedures that:

(1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of assets;

(2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures are being made only in accordance with the authorizations of management and directors; and

(3) provide reasonable assurance regarding the prevention or timely detection of unauthorized acquisition, use or disposition of assets that could have a material effect on our financial statements.

Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework provided in *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on this evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2018.

The effectiveness of our internal control over financial reporting as of December 31, 2018 has been audited by Ernst and Young LLP, an independent registered public accounting firm, as stated in their report, which is included herein.

Changes in Internal Control

As required by Rule 13a-15(d) of the Exchange Act, our management, including our principal executive officer and our principal financial officer, conducted an evaluation of the internal control over financial reporting to determine whether any changes occurred during the quarter ended December 31, 2018 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. Based on that evaluation, our principal executive officer and principal financial officer concluded no such changes during the quarter ended December 31, 2018 materially affected, or were reasonably likely to materially affect, our internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Ironwood Pharmaceuticals, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Ironwood Pharmaceuticals, Inc.'s internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control— Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), (the COSO criteria). In our opinion, Ironwood Pharmaceuticals, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on the COSO criteria .

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of Ironwood Pharmaceuticals, Inc. as of December 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes of the Company and our report dated February 25, 2019 expressed unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Boston, Massachusetts

February 25, 2019

Item 9B. ***Other Information***

None.

PART III

Item 10. ***Directors, Executive Officers and Corporate Governance***

We have adopted a code of business conduct and ethics applicable to our directors, executive officers and all other employees. A copy of that code is available on our corporate website at http://www.ironwoodpharma.com. Any amendments to the code of business conduct and ethics, and any waivers thereto involving our executive officers, also will be available on our corporate website. A printed copy of these documents will be made available upon request. The content on our website is not incorporated by reference into this Annual Report on Form 10-K.

Certain information regarding our executive officers is set forth at the end of Part I, Item 1 of this Form 10-K under the heading, "Executive Officers of the Registrant." The other information required by this item is incorporated by reference from our proxy statement for our 2019 Annual Meeting of Stockholders.

Item 11. ***Executive Compensation***

The information required by this item is incorporated by reference from our proxy statement for our 2019 Annual Meeting of Stockholders.

Item 12. ***Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters***

The information required by this item is incorporated by reference from our proxy statement for our 2019 Annual Meeting of Stockholders.

Item 13. ***Certain Relationships and Related Transactions, and Director Independence***

The information required by this item is incorporated by reference from our proxy statement for our 2019 Annual Meeting of Stockholders.

Item 14. ***Principal Accountant Fees and Services***

The information required by this item is incorporated by reference from our proxy statement for our 2019 Annual Meeting of Stockholders.

PART IV

Item 15. ***Exhibits and Financial Statement Schedules***

1. List of documents filed as part of this report

    1. Consolidated Financial Statements listed under Part II, Item 8 and included herein by reference.

    2. Consolidated Financial Statement Schedules

        No schedules are submitted because they are not applicable, not required or because the information is included in the Consolidated Financial Statements or Notes to Consolidated Financial Statements.

    3. Exhibits

		Incorporated by reference herein	
Number	**Description**	**Form**	**Date**
3.1	Eleventh Amended and Restated Certificate of Incorporation	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2010
3.2	Fifth Amended and Restated Bylaws	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2010
3.3	Certificate of Retirement	Registration Statement on Form 8-A/A (File No. 001-34620)	January 3, 2019
4.1	Specimen Class A common stock certificate	Registration Statement on Form S-1, as amended (File No. 333-163275)	January 20, 2010
4.2	Indenture, dated as of June 15, 2015, by and between Ironwood Pharmaceuticals, Inc. and U. S. Bank National Association (including the form of the 2.25% Convertible Senior Note due 2022)	Current Report on Form 8-K (File No. 001-34620)	June 15, 2015
4.3	Indenture, dated as of September 23, 2016, by and between Ironwood Pharmaceuticals, Inc. and U.S. Bank National Association (including the form of the 8.375% Notes due 2026)	Current Report on Form 8-K (File No. 001-34620)	September 26, 2016
10.1#	Amended and Restated 2002 Stock Incentive Plan and form agreements thereunder	Registration Statement on Form S-1, as amended (File No. 333-163275)	December 23, 2009
10.2#	Amended and Restated 2005 Stock Incentive Plan and form agreements thereunder	Registration Statement on Form S-1, as amended (File No. 333-163275)	January 29, 2010
10.3#	Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Registration Statement on Form S-8, as amended (File No. 333-184396)	October 12, 2012
10.3.1#	Form of Stock Option Agreement under the Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Quarterly Report on Form 10-Q (File No. 001-34620)	November 6, 2018

Number	Description	Incorporated by reference herein	
		Form	Date
10.3.2#	Form of Non-employee Director Restricted Stock Agreement under the Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.3.3#	Form of Restricted Stock Unit Agreement under the Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Quarterly Report on Form 10-Q (File No. 001-34620)	November 6, 2018
10.4#	Amended and Restated 2010 Employee Stock Purchase Plan	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.5#	Change of Control Severance Benefit Plan, as amended and restated	Quarterly Report on Form 10-Q (File No. 001-34620)	April 29, 2014
10.6#*	Form of Executive Severance Agreement		
10.7#	Director Compensation Plan effective January 1, 2014	Annual Report on Form 10-K (File No. 001-34620)	February 7, 2014
10.8#	Form of Indemnification Agreement with Directors and Officers	Registration Statement on Form S-1, as amended (File No. 333-163275)	December 23, 2009
10.9#	Offer Letter, dated January 3, 2019, between Ironwood Pharmaceuticals, Inc. and Mark Mallon	Current Report on Form 8-K (File No. 001-34620)	January 4, 2019
10.10+	Collaboration Agreement, dated as of September 12, 2007, as amended on November 3, 2009, by and between Forest Laboratories, Inc. and Ironwood Pharmaceuticals, Inc.	Registration Statement on Form S-1, as amended (File No. 333-163275)	February 2, 2010
10.10.1	Amendment No. 2 to the Collaboration Agreement, dated as of January 8, 2013, by and between Forest Laboratories, Inc. and Ironwood Pharmaceuticals, Inc.	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.11+	Commercial Agreement, dated as of January 31, 2017, by and among Allergan USA, Inc., Forest Laboratories LLC and Ironwood Pharmaceuticals, Inc.	Quarterly Report on Form 10-Q (File No. 001 34620)	May 8, 2017
10.12+	License Agreement, dated as of April 30, 2009, by and between Allergan Pharmaceuticals International Ltd. (formerly with Almirall, S.A.) and Ironwood Pharmaceuticals, Inc.	Registration Statement on Form S-1, as amended (File No. 333-163275)	February 2, 2010
10.12.1+	Amendment No. 1 to License Agreement, dated as of June 11, 2013, by and between Allergan Pharmaceuticals International Ltd. (formerly with Almirall, S.A.) and Ironwood Pharmaceuticals, Inc.	Quarterly Report on Form 10-Q (File No. 001-34620)	August 8, 2013

Number	Description	Incorporated by reference herein	
		Form	Date
10.12.2+	Amendment to the License Agreement, dated as of October 26, 2015, by and between Allergan Pharmaceuticals International Ltd. and Ironwood Pharmaceuticals, Inc.	Annual Report on Form 10-K (File No. 001-34620)	February 19, 2016
10.12.3+	Amendment to the License Agreement dated as of January 31, 2017, by and between Allergan Pharmaceuticals International Ltd. And Ironwood Pharmaceuticals, Inc.	Quarterly Report on Form 10-Q (File No. 001 34620)	May 8, 2017
10.13+	Novation Agreement, dated as of October 26, 2015, by and among Almirall, S.A., Allergan Pharmaceuticals International Ltd. and Ironwood Pharmaceuticals, Inc.	Annual Report on Form 10-K (File No. 001-34620)	February 19, 2016
10.14+	License Agreement, dated as of November 10, 2009, by and among Astellas Pharma Inc. and Ironwood Pharmaceuticals, Inc.	Registration Statement on Form S-1, as amended (File No. 333-163275)	February 2, 2010
10.15+	Collaboration Agreement, dated as of October 23, 2012, by and between AstraZeneca AB and Ironwood Pharmaceuticals, Inc.	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.16+	License Agreement, dated as of April 26, 2016, by and between Ardea Biosciences, Inc. and Ironwood Pharmaceuticals, Inc	Quarterly Report on Form 10-Q (File No. 001-34620)	August 8, 2016
10.17+	Commercial Supply Agreement, dated as of June 23, 2010, by and among PolyPeptide Laboratories, Inc. and Polypeptide Laboratories (SWEDEN) AB, Forest Laboratories, Inc. and Ironwood Pharmaceuticals, Inc.	Quarterly Report on Form 10-Q (File No. 001-34620)	August 10, 2010
10.18+	Commercial Supply Agreement, dated as of March 28, 2011, by and among Corden Pharma Colorado, Inc. (f/k/a Roche Colorado Corporation), Ironwood Pharmaceuticals, Inc. and Forest Laboratories, Inc.	Quarterly Report on Form 10-Q (File No. 001-34620)	May 13, 2011
10.18.1+	Amendment No. 3 to Commercial Supply Agreement, dated as of November 26, 2013, by and between Corden Pharma Colorado, Inc. (f/k/a Roche Colorado Corporation), Ironwood Pharmaceuticals, Inc. and Forest Laboratories, Inc.	Annual Report on Form 10-K (File No. 001-34620)	February 7, 2014

Number	Description	Incorporated by reference herein	
		Form	Date
10.19+	Commercial Supply Agreement, dated as of April 26, 2016, by and between AstraZeneca Pharmaceuticals LP and Ironwood Pharmaceuticals, Inc.	Quarterly Report on Form 10-Q (File No. 001-34620)	August 8, 2016
10.20	Lease for facilities at 301 Binney St., Cambridge, MA, dated as of January 12, 2007, as amended on April 9, 2009, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Registration Statement on Form S-1, as amended (File No. 333-163275)	December 23, 2009
10.20.1	Second Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of February 9, 2010, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2010
10.20.2	Third Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of July 1, 2010, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2011
10.20.3	Fourth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of February 3, 2011, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2011
10.20.4	Fifth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of October 18, 2011, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 29, 2012
10.20.5	Sixth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of July 19, 2012, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.20.6	Seventh Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of October 30, 2012, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.20.7	Eighth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of July 8, 2014, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015

Number	Description	Incorporated by reference herein	
		Form	Date
10.20.8	Ninth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of October 27, 2014, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.20.9	Tenth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of January 21, 2015, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.20.10	Eleventh Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of June 30, 2016, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 22, 2017
10.20.11	Sublease, dated as of July 1, 2014, by and between Biogen Idec MA Inc. and Ironwood Pharmaceuticals, Inc. to Lease for facilities at 301 Binney St., Cambridge, MA, as amended, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.21	Base Call Option Transaction Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.22	Base Call Option Transaction Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.23	Base Warrants Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.24	Base Warrants Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.25	Additional Call Option Transaction Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015

Number	Description	Incorporated by reference herein	
		Form	Date
10.26	Additional Call Option Transaction Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.27	Additional Warrants Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.28	Additional Warrants Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
21.1*	Subsidiaries of Ironwood Pharmaceuticals, Inc.		
23.1*	Consent of Independent Registered Public Accounting Firm		
31.1*	Certification of Chief Executive Officer pursuant to Rules 13a-14 or 15d-14 of the Exchange Act		
31.2*	Certification of Chief Financial Officer pursuant to Rules 13a-14 or 15d-14 of the Exchange Act		
32.1‡	Certification of Chief Executive Officer pursuant to Rules 13a-14(b) or 15d-14(b) of the Exchange Act and 18 U.S.C. Section 1350		
32.2‡	Certification of Chief Financial Officer pursuant to Rules 13a-14(b) or 15d-14(b) of the Exchange Act and 18 U.S.C. Section 1350		
101.INS*	XBRL Instance Document		
101.SCH*	XBRL Taxonomy Extension Schema Document		
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document		
101.LAB*	XBRL Taxonomy Extension Label Linkbase Database		
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase Document		
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document		

* Filed herewith.

‡ Furnished herewith.

+ Confidential treatment granted under 17 C.F.R. §§200.80(b)(4) and 230.406. The confidential portions of this exhibit have been omitted and are marked accordingly. The confidential portions have been provided separately to the SEC pursuant to the confidential treatment request.

Management contract or compensatory plan, contract, or arrangement.

(b) Exhibits.

The exhibits required by this Item are listed under Item 15(a)(3).

(c) Financial Statement Schedules.

The financial statement schedules required by this Item are listed under Item 15(a)(2).

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Cambridge, Commonwealth of Massachusetts, on the 25 th day of February 2019.

Ironwood Pharmaceuticals, Inc.
By: /s/ Peter M. Hecht
Peter M. Hecht
Chief Executive Officer

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the date indicated.

Signature	Title	Date
/s/ Peter M. Hecht Peter M. Hecht	Chief Executive Officer and Director (Principal Executive Officer)	February 25, 2019
/s/ gina consylman Gina Consylman	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	February 25, 2019
/s/ Terrance G. McGuire Terrance G. McGuire	Chairman of the Board	February 25, 2019
/s/ Andrew Dreyfus Andrew Dreyfus	Director	February 25, 2019
/s/ Marsha H. Fanucci Marsha H. Fanucci	Director	February 25, 2019
/s/ Julie H. McHugh Julie H. McHugh	Director	February 25, 2019
/s/ Lawrence S. Olanoff Lawrence S. Olanoff	Director	February 25, 2019
/s/ Edward P. Owens Edward P. Owens	Director	February 25, 2019
/s/ Amy W. Schulman Amy W. Schulman	Director	February 25, 2019
/s/ Douglas E. Williams Douglas E. Williams	Director	February 25, 2019

Index to Consolidated Financial Statements of
Ironwood Pharmaceuticals, Inc.

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Ironwood Pharmaceuticals, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Ironwood Pharmaceuticals, Inc. (the Company) as of December 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Company at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 25, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 1998.

Boston, Massachusetts

February 25, 2019

Ironwood Pharmaceuticals, Inc.
Consolidated Balance Sheet s
(In thousands, except share and per share amounts)

	December 31, 2018	December 31, 2017
ASSETS		
Current assets:		
Cash and cash equivalents	$ 173,172	$ 125,736
Available-for-sale securities	—	95,680
Accounts receivable, net	20,991	3,190
Related party accounts receivable, net	59,959	78,967
Inventory, net	—	735
Prepaid expenses and other current assets	11,063	7,288
Restricted cash	1,250	—
Total current assets	266,435	311,596
Restricted cash, net of current portion	6,426	7,056
Property and equipment, net	17,270	17,274
Convertible note hedges	41,020	108,188
Intangible assets, net	—	159,905
Goodwill	785	785
Other assets	114	870
Total assets	$ 332,050	$ 605,674
LIABILITIES AND STOCKHOLDERS' (DEFICIT) EQUITY		
Current liabilities:		
Accounts payable	$ 18,123	$ 15,958
Accrued research and development costs	8,219	7,313
Accrued expenses and other current liabilities	45,252	38,237
Capital lease obligations	73	4,077
Current portion of deferred rent	252	195
Current portion of 2026 Notes	47,554	—
Current portion of contingent consideration	51	247
Total current liabilities	119,524	66,027
Capital lease obligations, net of current portion	158	—
Deferred rent, net of current portion	6,308	5,449
Contingent consideration, net of current portion	—	31,011
Note hedge warrants	33,763	92,188
Convertible senior notes	265,601	249,193
2026 Notes, net of current portion	100,537	146,898
Other liabilities	2,530	5,060
Commitments and contingencies		
Stockholders' (deficit) equity:		
Preferred stock, $0.001 par value, 75,000,000 shares authorized, no shares issued and outstanding	—	—
Class A common stock, $0.001 par value, 500,000,000 shares authorized and 154,414,691 issued and outstanding at December 31, 2018 and 500,000,000 shares authorized and 136,465,526 shares issued and outstanding at December 31, 2017	154	137
Class B common stock, $0.001 par value, no shares authorized, issued or outstanding at December 31, 2018 and 100,000,000 shares authorized and 13,983,762 shares issued outstanding at December 31, 2017	—	14
Additional paid-in capital	1,394,603	1,318,536
Accumulated deficit	(1,591,128)	(1,308,760)
Accumulated other comprehensive loss	—	(79)
Total stockholders' (deficit) equity	(196,371)	9,848
Total liabilities and stockholders' (deficit) equity	$ 332,050	$ 605,674

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

Ironwood Pharmaceuticals, Inc.

Consolidated Statements of Operations

(In thousands, except per share amounts)

	Years Ended December 31,		
	2018	2017	2016
Revenues:			
Collaborative arrangements revenue	$ 272,839	$ 265,533	$ 263,923
Product revenue, net	3,445	3,061	109
Sale of active pharmaceutical ingredient	70,355	29,682	9,925
Total revenues	346,639	298,276	273,957
Cost and expenses:			
Cost of revenues, excluding amortization of acquired intangible assets	32,751	19,097	1,868
Write-down of commercial supply and inventory to net realizable value and loss on non-cancellable purchase commitments	247	309	374
Research and development	166,503	148,228	139,492
Selling, general and administrative	241,291	233,123	173,281
Amortization of acquired intangible assets	8,111	6,214	981
(Gain) loss on fair value remeasurement of contingent consideration	(31,045)	(31,310)	9,831
Restructuring expenses	15,879	—	—
Impairment of intangible assets	151,794	—	—
Total cost and expenses	585,531	375,661	325,827
Loss from operations	(238,892)	(77,385)	(51,870)
Other (expense) income:			
Interest expense	(37,724)	(36,370)	(39,153)
Interest and investment income	2,991	2,111	1,169
(Loss) gain on derivatives	(8,743)	(3,284)	8,146
Loss on extinguishment of debt	—	(2,009)	—
Other expense, net	(43,476)	(39,552)	(29,838)
Net loss	$ (282,368)	$ (116,937)	$ (81,708)
Net loss per share—basic and diluted	$ (1.85)	$ (0.78)	$ (0.56)
Weighted average number of common shares used in net loss per share—basic and diluted:	152,634	148,993	144,928

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

Ironwood Pharmaceuticals, Inc.

Consolidated Statements of Comprehensive Los s

(In thousands)

	Years Ended December 31,		
	2018	2017	2016
Net loss	$ (282,368)	$ (116,937)	$ (81,708)
Other comprehensive income (loss):			
Unrealized gains (losses) on available-for-sale securities	79	(72)	79
Total other comprehensive income (loss)	79	(72)	79
Comprehensive loss	$ (282,289)	$ (117,009)	$ (81,629)

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

Ironwood Pharmaceuticals, Inc.

Consolidated Statements of Stockholders' Equit y

(In thousands, except share amounts)

	Class A common stock		Class B common stock		Additional paid-in	Accumulated	Accumulated other comprehensive	Total Stockholders' equity
	Shares	Amount	Shares	Amount	capital	deficit	income (loss)	(deficit)
Balance at December 31, 2015	127,371,478	127	15,870,356	16	1,205,183	(1,110,115)	(86)	95,125
Issuance of common stock upon exercise of stock options and employee stock purchase plan	1,813,018	3	1,867,111	2	23,996	—	—	24,001
Issuance of common stock awards	193,501	—	—	—	20	—	—	20
Conversion of Class B common stock to Class A common stock	3,253,390	3	(3,253,390)	(3)	—	—	—	—
Share-based compensation expense related to share-based awards to non-employees	—	—	—	—	529	—	—	529
Share-based compensation expense related to share-based awards to employees and employee stock purchase plan	—	—	—	—	28,670	—	—	28,670
Unrealized gains on available-for-sale securities	—	—	—	—	—	—	79	79
Net loss	—	—	—	—	—	(81,708)	—	(81,708)
Balance at December 31, 2016	132,631,387	133	14,484,077	15	1,258,398	(1,191,823)	(7)	66,716
Issuance of common stock upon exercise of stock options and employee stock purchase plan	2,156,152	3	1,042,047	—	26,318	—	—	26,321
Issuance of common stock awards	135,625	—	—	—	14	—	—	14
Conversion of Class B common stock to Class A common stock	1,542,362	1	(1,542,362)	(1)	—	—	—	—
Share-based compensation expense related to share-based awards to non-employees	—	—	—	—	301	—	—	301
Share-based compensation expense related to share-based awards to employees and employee stock purchase plan	—	—	—	—	33,505	—	—	33,505
Unrealized losses on available-for-sale securities	—	—	—	—	—	—	(72)	(72)
Net loss	—	—	—	—	—	(116,937)	—	(116,937)
Balance at December 31, 2017	136,465,526	137	13,983,762	14	1,318,536	(1,308,760)	(79)	9,848
Issuance of common stock upon exercise of stock options and employee stock purchase plan	3,070,139	3	764,361	—	32,058	—	—	32,061
Issuance of common stock awards	130,903	—	—	—	—	—	—	—
Conversion of Class B common stock to Class A common stock	14,748,123	14	(14,748,123)	(14)	—	—	—	—
Share-based compensation expense related to share-based awards to employees and employee stock purchase plan	—	—	—	—	44,009	—	—	44,009
Unrealized gains on available-for-sale securities	—	—	—	—	—	—	79	79
Net loss	—	—	—	—	—	(282,368)	—	(282,368)
Balance at December 31, 2018	154,414,691	$ 154	—	$ —	$1,394,603	$ (1,591,128)	$ —	$ (196,371)

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

Ironwood Pharmaceuticals, Inc.
Consolidated Statements of Cash Flow s
(In thousands)

	Year Ended December 31,		
	2018	2017	2016
Cash flows from operating activities:			
Net loss	$ (282,368)	$ (116,937)	$ (81,708)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation and amortization	6,112	8,403	10,279
Amortization of acquired intangible assets	8,111	6,214	981
Impairment of intangible assets	151,794	—	—
(Gain) loss on disposal of property and equipment	(1,867)	694	(204)
Share-based compensation expense	43,977	33,820	29,219
Change in fair value of note hedge warrants	(58,425)	(21,049)	37,909
Change in fair value of convertible note hedges	67,168	24,333	(46,055)
Write-down of commercial supply and inventory to net realizable value and loss on non-cancellable purchase commitments	219	309	374
Write-down of excess non-cancellable ZURAMPIC and DUZALLO sample purchase commitments	390	1,313	—
Gain on facility subleases	—	(1,579)	3,480
Accretion of discount/premium on investment securities	(165)	(75)	667
Non-cash interest expense	17,601	16,080	14,812
Non-cash change in fair value of contingent consideration	(31,045)	(31,310)	9,831
Loss on extinguishment of debt	—	2,009	—
Changes in assets and liabilities:			
Accounts receivable and related party accounts receivable, net	1,207	(17,303)	(10,336)
Prepaid expenses and other current assets	(3,421)	1,384	(3,069)
Inventory, net	(806)	346	—
Other assets	757	115	1,643
Accounts payable, related party accounts payable and accrued expenses	8,057	(6,843)	19,683
Accrued research and development costs	906	376	2,692
Deferred revenue	—	—	(8,989)
Deferred rent	916	(1,053)	(7,143)
Net cash used in operating activities	(70,882)	(100,753)	(25,934)
Cash flows from investing activities:			
Purchases of available-for-sale securities	(3,241)	(191,354)	(311,116)
Sales and maturities of available-for-sale securities	99,165	346,890	237,423
Purchases of property and equipment	(8,621)	(4,211)	(4,206)
Payment for acquisition of lesinurad license	—	—	(100,000)
Proceeds from sale of property and equipment	1,563	135	225
Net cash provided by (used in) investing activities	88,866	151,460	(177,674)
Cash flows from financing activities:			
Proceeds from issuance of 2026 Notes, net of discount to lender	—	146,250	—
Costs associated with issuance of 2026 Notes	—	(235)	(246)
Proceeds from exercise of stock options and employee stock purchase plan	32,061	26,370	24,841
Payments on capital lease obligations	(1,824)	(3,234)	(1,903)
Principal payments on PhaRMA notes	—	(134,258)	(26,868)
Payments on contingent purchase price consideration	(165)	(15,058)	—
Net cash provided by (used in) financing activities	30,072	19,835	(4,176)
Net increase (decrease) in cash, cash equivalents and restricted cash	48,056	70,542	(207,784)
Cash, cash equivalents and restricted cash, beginning of period	132,792	62,250	270,034
Cash, cash equivalents and restricted cash, end of period	$ 180,848	$ 132,792	$ 62,250
Reconciliation of cash, cash equivalents, and restricted cash to the consolidated balance sheets			
Cash and cash equivalents	$ 173,172	$ 125,736	$ 54,004
Restricted cash	7,676	7,056	8,246
Total cash, cash equivalents, and restricted cash	$ 180,848	$ 132,792	$ 62,250
Supplemental cash flow disclosure:			
Cash paid for interest	$ 18,235	$ 20,388	$ 24,473
Non-cash investing and financing activities			
Contingent consideration	$ —	$ —	$ 67,885
Purchases under capital leases	$ 664	$ 1,151	$ 6,277
Extinguishment of capital leases	$ 2,687	$ 149	$ 1,001
Fixed asset purchases in accounts payable and accrued expenses	$ 439	$ 1,136	$ 353

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

Ironwood Pharmaceuticals, Inc.

Notes to Consolidated Financial Statements

1. Nature of Business

Ironwood Pharmaceuticals, Inc. (the "Company") is a gastrointestinal ("GI") focused healthcare company leveraging its proven development and commercial capabilities as it seeks to bring multiple medicines to patients. The Company is advancing innovative product opportunities in areas of large unmet need, capitalizing on its expertise in GI diseases.

The Company's commercial product, linaclotide, is available to adult men and women suffering from irritable bowel syndrome with constipation ("IBS-C"), or chronic idiopathic constipation ("CIC"), in certain countries around the world. Linaclotide is available under the trademarked name LINZESS ® to adult men and women suffering from IBS-C or CIC in the United States (the "U.S.") and Mexico and to adult men and women suffering from IBS-C in Japan. Linaclotide is available, under the trademarked name CONSTELLA ® to adult men and women suffering from IBS-C or CIC in Canada, and to adult men and women suffering from IBS-C in certain European countries.

The Company and its partner Allergan plc (together with its affiliates, "Allergan"), began commercializing LINZESS in the U.S. in December 2012. Under the Company's collaboration with Allergan for North America, total net sales of LINZESS in the U.S., as recorded by Allergan, are reduced by commercial costs incurred by each party, and the resulting amount is shared equally between the Company and Allergan. Allergan also has an exclusive license from the Company to develop and commercialize linaclotide in all countries other than China, Hong Kong, Macau, Japan and the countries and territories of North America (the "Allergan License Territory"). On a country-by-country and product-by-product basis in the Allergan License Territory, Allergan pays the Company a royalty as a percentage of net sales of products containing linaclotide as an active ingredient. In addition, Allergan has exclusive rights to commercialize linaclotide in Canada as CONSTELLA and in Mexico as LINZESS.

Astellas Pharma Inc. ("Astellas"), the Company's partner in Japan, has an exclusive license to develop and commercialize linaclotide in Japan. In March 2017, Astellas began commercializing LINZESS for the treatment of adults with IBS-C in Japan, and in September 2018, Astellas began commercializing LINZESS for the treatment of adults with chronic constipation in Japan. The Company has a collaboration agreement with AstraZeneca AB (together with its affiliates, "AstraZeneca"), to co-develop and co-commercialize linaclotide in China, Hong Kong and Macau, with AstraZeneca having primary responsibility for the local operational execution. In January 2019, the National Medical Products Administration approved the marketing application for LINZESS for adults with IBS-C in China.

The Company and Allergan are exploring ways to enhance the clinical profile of LINZESS by studying linaclotide in additional indications, populations and formulations to assess its potential to treat various conditions. In July 2018, the Company announced the initiation of a Phase IIIb trial evaluating the efficacy and safety of linaclotide 290 mcg on multiple abdominal symptoms in addition to pain, including bloating and discomfort, in adult patients with IBS-C.

The Company and Allergan are also seeking to expand the clinical utility of linaclotide by demonstrating the pain-relieving effect of a delayed release formulation through the advancement of MD-7246 (linaclotide delayed release) in IBS with diarrhea ("IBS-D").

The Company is advancing another GI development program, IW-3718, a gastric retentive formulation of a bile acid sequestrant, for the potential treatment of persistent gastroesophageal reflux disease ("GERD"). In June 2018, the Company initiated two Phase III clinical trials evaluating the safety and efficacy of IW-3718 in patients with persistent GERD.

In May 2018, the Company announced its intent, as authorized by its Board of Directors, to separate its soluble guanylate cyclase ("sGC ") business from its commercial and GI business, resulting in two independent, publicly traded companies, Ironwood and Cyclerion Therapeutics, Inc. ("Cyclerion"). The Company expects the separation will be completed in the first half of 2019. Cyclerion is expected to be a clinical-stage biopharmaceutical company harnessing the power of sGC pharmacology to discover, develop, and commercialize breakthrough treatments for serious and orphan diseases. Upon separation, Cyclerion is expected to focus on enabling the full therapeutic potential of next-

generation sGC stimulators. sGC stimulators are small molecules that act synergistically with nitric oxide on sGC to boost production of cyclic guanosine monophosphate ("cGMP"). cGMP is a key second messenger that, when produced by sGC, regulates diverse and critical biological functions throughout the body including blood flow and vascular dynamics, inflammatory and fibrotic diseases, metabolism and neuronal function. Cyclerion believes that the key to unlocking the full therapeutic potential of the nitric oxide-cGMP pathway is to design differentiated next-generation sGC stimulators that preferentially modulate pathway signaling in tissues of greatest relevance to the diseases they are developed to treat. This targeted approach is intended to maximize the potential benefits of nitric oxide-cGMP pathway stimulation in disease-relevant tissues. Cyclerion's portfolio is anticipated to be comprised of several sGC stimulators. Olinciguat is a vascular sGC stimulator in Phase II development for the potential treatment of sickle cell disease, and praliciguat is a systemic sGC stimulator in Phase II development for the potential treatment of heart failure with preserved ejection fraction. Cyclerion is expected to advance additional sGC stimulator development programs in pre-clinical and discovery phases.

The Company has periodically entered into co-promotion agreements to maximize its salesforce productivity. As part of this strategy, in August 2015, the Company and Allergan entered into an agreement for the co-promotion of VIBERZI ® (eluxadoline) in the U.S., Allergan's treatment for adults suffering from IBS with diarrhea ("IBS-D"). In January 2017, the Company and Allergan entered into a commercial agreement under which adjustments to the Company's or Allergan's share of the net profits under the share adjustment provision of the collaboration agreement for linaclotide in North America are eliminated, in full, in 2018 and all subsequent years. As part of this agreement, Allergan appointed the Company, on a non-exclusive basis, to promote CANASA ® (mesalamine), approved for the treatment of ulcerative proctitis, and DELZICOL ® (mesalamine), approved for the treatment of ulcerative colitis, in the U.S. for approximately two years. In December 2017, this agreement was amended to include and extend the promotion of VIBERZI through December 31, 2018 and discontinue the promotion of DELZICOL effective January 1, 2018. In December 2018, the Company and Allergan entered into an agreement to discontinue the Company's promotion of CANASA effective December 31, 2018, and to extend the Company's promotion of VIBERZI through March 31, 2019.

These agreements are more fully described in Note 4, *Goodwill and Intangible Assets,* and Note 5, *Collaboration, License, Co-Promotion and Other Commercial Agreements,* to these consolidated financial statements.

In September 2016, the Company closed a direct private placement, pursuant to which the Company subsequently issued $150.0 million in aggregate principal amount of 8.375% notes due 2026 (the "2026 Notes") on January 5, 2017 (the "Funding Date"). The Company received net proceeds of approximately $11.2 million from the 2026 Notes, after redemption of the PhaRMA Notes outstanding balance and accrued interest of approximately $135.1 million and deducting fees and expenses of approximately $3.7 million. The proceeds from the issuance of the 2026 Notes were used to redeem the outstanding principal balance of the 11% PhaRMA Notes due 2024 (the "PhaRMA Notes"), on the Funding Date. These transactions are more fully described in Note 11, *Notes Payable* , to these consolidated financial statements.

The Company was incorporated in Delaware on January 5, 1998 as Microbia, Inc. On April 7, 2008, the Company changed its name to Ironwood Pharmaceuticals, Inc. To date, the Company has dedicated a majority of its activities to the research, development and commercialization of linaclotide and commercialization of lesinurad, as well as to the research and development of its other product candidates. The Company has incurred significant operating losses since its inception in 1998. As of December 31, 2018, the Company had an accumulated deficit of approximately $1.6 billion.

2. Summary of Significant Accounting Policies

Principles of Consolidation

The accompanying consolidated financial statements include the accounts of Ironwood Pharmaceuticals, Inc. and its wholly owned subsidiaries, Cyclerion, Ironwood Pharmaceuticals Securities Corporation and Ironwood Pharmaceuticals GmbH. All intercompany transactions and balances are eliminated in consolidation.

Segment Information

Operating segments are components of an enterprise for which separate financial information is available and is evaluated regularly by the Company's chief operating decision-maker in deciding how to allocate resources and in assessing performance. The Company currently operates in one reportable business segment—human therapeutics.

Reclassifications and Revisions to Prior Period Financial Statements

Certain prior period financial statement items, such as Restricted Cash, have been reclassified to conform to current period presentation.

Use of Estimates

The preparation of consolidated financial statements in accordance with U.S. generally accepted accounting principles requires the Company's management to make estimates and judgments that may affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements, and the amounts of revenues and expenses during the reported periods. On an on-going basis, the Company's management evaluates its estimates, judgments and methodologies. Significant estimates and assumptions in the consolidated financial statements include those related to revenue recognition, including returns, rebates, and other pricing adjustments; available-for-sale securities; inventory valuation, and related reserves; impairment of long-lived assets including its acquired intangible assets and goodwill; initial valuation procedures for the issuance of convertible notes; fair value of derivatives; balance sheet classification of notes payable and convertible notes; income taxes, including the valuation allowance for deferred tax assets; research and development expenses; contingent consideration; contingencies and share-based compensation. The Company bases its estimates on historical experience and on various other assumptions that are believed to be reasonable, the results of which form the basis for making judgments about the carrying values of assets and liabilities. Actual results may differ materially from these estimates under different assumptions or conditions. Changes in estimates are reflected in reported results in the period in which they become known.

Cash and Cash Equivalents

The Company considers all highly liquid investment instruments with a remaining maturity when purchased of three months or less to be cash equivalents. Investments qualifying as cash equivalents primarily consist of money market funds, U.S. government-sponsored securities, and repurchase agreements. The carrying amount of cash equivalents approximates fair value. The amount of cash equivalents included in cash and cash equivalents was approximately $173.1 million and approximately $126.3 million at December 31, 2018 and 2017, respectively.

Restricted Cash

The Company is contingently liable under unused letters of credit with a bank, related to the Company's facility lease and automobile lease agreements, in the amount of approximately $7.7 million and approximately $7.1 million as of December 31, 2018 and 2017, respectively, which the Company records as restricted cash to secure these letters of credit. The cash will be restricted until the termination or modification of the lease arrangements. The amount of restricted cash in current assets and non-current assets was approximately $1.3 million and $6.4 million at December 31, 2018, respectively.

Available-for-Sale Securities

The Company classifies all short-term investments with a remaining maturity when purchased of greater than three months as available-for-sale. Available-for-sale debt securities are recorded at fair value, with the unrealized gains and losses reported in other comprehensive income (loss). The amortized cost of debt securities in this category is adjusted for the amortization of premiums and accretion of discounts to maturity. Such amortization is included in interest and investment income. Realized gains and losses, interest, dividends, and declines in value judged to be other than temporary on available-for-sale securities are included in interest and investment income.

The cost of securities sold is based on the specific identification method for purposes of recording realized gains and losses. To determine whether an other-than-temporary impairment exists, the Company considers whether it has the ability and intent to hold the investment until a market price recovery, and whether evidence indicating the recoverability of the cost of the investment outweighs evidence to the contrary. There were no other-than-temporary impairments for the years ended December 31, 2018, 2017 or 2016.

Inventory

Inventory is stated at the lower of cost or net realizable value with cost determined under the first-in, first-out basis in accordance with Accounting Standards Update ("ASU") No. 2015-11, *Inventory (Topic 330): Simplifying the Measurement of Inventory* ("ASU 2015-11").

The Company evaluates inventory levels quarterly and any inventory that has a cost basis in excess of its expected net realizable value, inventory that becomes obsolete, inventory in excess of expected sales requirements, inventory that fails to meet commercial sale specifications or is otherwise impaired is written down with a corresponding charge to the statement of operations in the period that the impairment is first identified. The Company also assesses, on a quarterly basis, whether it has any excess non-cancelable purchase commitments resulting from its minimum supply agreements with its suppliers. The Company relies on data from several sources to estimate the net realizable value of inventory and non-cancelable purchase commitments, including partner forecasts of projected inventory purchases that are received quarterly, the Company's internal forecasts and related process, historical sales by geographic region, and the status of and progress toward commercialization of linaclotide in partnered territories.

The Company capitalizes inventories manufactured in preparation for initiating sales of a product candidate when the related product candidate is considered to have a high likelihood of regulatory approval and the related costs are expected to be recoverable through sales of the inventories. In determining whether or not to capitalize such inventories, the Company evaluates, among other factors, information regarding the product candidate's safety and efficacy, the status of regulatory submissions and communications with regulatory authorities and the outlook for commercial sales, including the existence of current or anticipated competitive drugs and the availability of reimbursement. In addition, the Company evaluates risks associated with manufacturing the product candidate, including the ability of the Company's third-party suppliers to complete the validation batches, and the remaining shelf life of the inventories.

Costs associated with developmental products prior to satisfying the inventory capitalization criteria are charged to research and development expense as incurred.

Concentrations of Suppliers

The Company relies on third-party manufacturers and its collaboration partners to manufacture the linaclotide active pharmaceutical ingredient ("API"), linaclotide drug product and lesinurad finished goods through the termination of the exclusive license with AstraZeneca to develop, manufacture, and commercialize in the U.S. products containing lesinurad as an active ingredient (the "Lesinurad License").

Currently, there are three third-party facilities actively producing linaclotide API. The Company also has an agreement with another independent third party to serve as a redundant linaclotide API manufacturing capacity to support its partnered territories. Each of Allergan and Astellas is responsible for drug product manufacturing of linaclotide into finished product for its respective territory. Under the collaboration with AstraZeneca, the Company is accountable for drug product and finished goods manufacturing for China and Macau and for drug product manufacturing for Hong Kong, with AstraZeneca accountable for finished goods manufacturing for Hong Kong.

In connection with the Lesinurad License, the Company and AstraZeneca entered into a commercial supply agreement (the "Lesinurad CSA"), pursuant to which the Company relied exclusively on AstraZeneca for the commercial manufacture and supply of ZURAMPIC and DUZALLO. In August 2018, the Company delivered to AstraZeneca a notice of termination of the Lesinurad License Agreement, which termination was made with respect to all products under the Lesinurad License Agreement.

If any of the Company's suppliers were to limit or terminate production or otherwise fail to meet the quality or delivery requirements needed to satisfy the supply commitments, the process of locating and qualifying alternate sources

could require up to several months, during which time the Company's production could be delayed. Such delays could have a material adverse effect on the Company's business, financial position and results of operations.

Accounts Receivable and Related Valuation Account

The Company makes judgments as to its ability to collect outstanding receivables and provides an allowance for receivables when collection becomes doubtful. Provisions are made based upon a specific review of all significant outstanding invoices and the overall quality and age of those invoices not specifically reviewed. The Company's receivables relate to amounts reimbursed under its collaboration, license and co-promotion agreements, as well as amounts due from product sales to wholesalers. The Company believes that credit risks associated with these partners and wholesalers are not significant. To date, the Company has not had any significant write-offs of bad debt, and the Company did not have an allowance for doubtful accounts as of December 31, 2018.

Concentrations of Credit Risk

Financial instruments that subject the Company to credit risk primarily consist of cash and cash equivalents, restricted cash, available-for-sale securities, and accounts receivable. The Company maintains its cash and cash equivalent balances with high-quality financial institutions and, consequently, the Company believes that such funds are subject to minimal credit risk. The Company's available-for-sale investments have primarily consisted of U.S. Treasury securities and certain U.S. government-sponsored securities and have potentially subjected the Company to concentrations of credit risk. The Company has adopted an investment policy which limits the amounts the Company may invest in certain types of investments, and requires all investments held by the Company to be at least A- rated, thereby reducing credit risk exposure.

Accounts receivable, including related party accounts receivable, primarily consist of amounts due under the linaclotide collaboration agreement with Allergan for North America and the linaclotide license agreement with Astellas for Japan (Note 5), and also from wholesalers. The Company does not obtain collateral for its accounts receivable. Accounts receivable or payable to or from Allergan are presented as related party transactions on the consolidated balance sheets as Allergan owns common stock of the Company.

The percentages of revenue recognized from significant customers of the Company in the years ended December 31, 2018, 2017 and 2016 as well as the account receivable balances, net of any payables due, at December 31, 2018 and 2017 are included in the following table:

	Accounts Receivable December 31,		Revenue Year Ended December 31,		
	2018	2017	2018	2017	2016
Collaborative Partner:					
Allergan (North America and Europe)	72 %	96 %	77 %	88 %	82 %
Astellas (Japan)	26 %	3 %	20 %	10 %	16 %

For the years ended December 31, 2018, 2017 and 2016, no additional customers accounted for more than 10% of the Company's revenue.

Property and Equipment

Property and equipment, including leasehold improvements, are recorded at cost, and are depreciated when placed into service using the straight-line method based on their estimated useful lives as follows:

Asset Description	Estimated Useful Life (In Years)
Manufacturing equipment	10
Laboratory equipment	5
Computer and office equipment	3
Furniture and fixtures	7
Software	3

Included in property and equipment are certain costs of software obtained for internal use. Costs incurred during the preliminary project stage are expensed as incurred, while costs incurred during the application development stage are capitalized and amortized over the estimated useful life of the software. The Company also capitalizes costs related to specific upgrades and enhancements when it is probable the expenditures will result in additional functionality. Maintenance and training costs related to software obtained for internal use are expensed as incurred.

Leasehold improvements are amortized over the shorter of the estimated useful life of the asset or the lease term. Capital lease assets are amortized over the lease term. However, if ownership was transferred by the end of the capital lease, or there was a bargain purchase option, such capital lease assets would be amortized over the useful life that would be assigned if such assets were owned.

Costs for capital assets not yet placed into service have been capitalized as construction in progress, and will be depreciated in accordance with the above guidelines once placed into service. Maintenance and repair costs are expensed as incurred.

Finite Lived Intangible Assets

The Company records the fair value of purchased intangible assets with finite useful lives as of the transaction date of a business combination. Purchased intangible assets with finite useful lives are amortized to their estimated residual values over their estimated useful lives. The Company amortizes intangible assets that have finite lives using either the straight-line method, or if reliably determinable, based on the pattern in which the economic benefit of the asset is expected to be utilized. The Company evaluates the finite-lived intangible assets for impairment whenever events or changes in circumstances indicate the reduction in the fair value below their respective carrying amounts. In addition, the remaining estimated useful life of the finite-lived intangible asset would be reassessed.

The value of the Company's finite-lived intangible assets was based on the future expected net cash flows related to ZURAMPIC and DUZALLO (the "Lesinurad Products"), which included significant assumptions around future net sales and the respective investment to support these products.

The Company evaluates its finite-lived intangible assets for impairment whenever events or changes in circumstances indicate the reduction in the fair value below their respective carrying amounts. In connection with each impairment assessment in which indicators of impairment have been identified, the Company compares the fair value of the asset as of the date of the assessment with the carrying value of the asset on the Company's consolidated balance sheet. If an indicator of impairment exists, the Company compares the carrying value of the intangible asset or asset group to the undiscounted cash flows expected from that asset or asset group. If impairment is indicated by this test, the intangible asset is written down by the amount by which the discounted cash flows expected from the intangible asset exceeds its carrying value. To estimate the cash flows expected for the assets, the Company uses market participant assumptions pursuant to Accounting Standards Codification ("ASC") 820, *Fair Value* . For the lesinurad finite-lived intangible assets, the Company made significant assumptions as part of this assessment including but not limited to future net product sales, respective cost of product sales, and operating expenses. The Company believes that the following factors, among others, could trigger an impairment review: significant underperformance relative to historical or projected future operating results; significant changes in the manner of the Company's use of the acquired assets or the strategy for the Company's overall business; approval of competitive products; and significant negative industry or economic trends. If the Company determines that an impairment has occurred, a write-down of the carrying value and an impairment charge to operating expenses in the period the determination is made is recorded. During the year ended December 31, 2018, the Company recorded an impairment charge of approximately $151.8 million related to its ZURAMPIC and DUZALLO intangible assets. For additional information relating to the impairment of these assets, see Note 4, *Goodwill and Intangible Assets* , to the Company's consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Goodwill

Goodwill represents the difference between the purchase price and the fair value of the identifiable tangible and intangible net assets when accounted for using the purchase method of accounting. Goodwill is not amortized, but is reviewed for impairment. The Company tests its goodwill for impairment annually as of October 1 st , or more frequently if events or changes in circumstances indicate that would more likely than not reduce the fair value of the reporting unit below its carrying value. Impairment may result from, among other things, deterioration in the performance of the

acquired asset, adverse market conditions, adverse changes in applicable laws or regulations and a variety of other circumstances. If the Company determines that an impairment has occurred, a write-down of the carrying value and an impairment charge to operating expenses in the period the determination is made is recorded. In evaluating the carrying value of goodwill, the Company must make assumptions regarding estimated future cash flows and other factors. Changes in strategy or market conditions could significantly impact those judgments in the future and require an adjustment to the recorded balances. There were no impai rments of goodwill for the years ended December 31, 2018 or 2017.

Impairment of Long-Lived Assets

The Company regularly reviews the carrying amount of its long-lived assets to determine whether indicators of impairment may exist, which warrant adjustments to carrying values or estimated useful lives. If indications of impairment exist, projected future undiscounted cash flows associated with the asset are compared to the carrying amount to determine whether the asset's value is recoverable. If the carrying value of the asset exceeds such projected undiscounted cash flows, the asset will be written down to its estimated fair value. There were no significant impairments of long-lived assets for the years ended December 31, 2018, 2017, or 2016.

Income Taxes

The Company provides for income taxes under the liability method. Deferred tax assets and liabilities are determined based on differences between financial reporting and tax bases of assets and liabilities and are measured using the enacted tax rates in effect when the differences are expected to reverse. Deferred tax assets are reduced by a valuation allowance to reflect the uncertainty associated with their ultimate realization.

The Company accounts for uncertain tax positions recognized in the consolidated financial statements in accordance with the provisions of ASC Topic 740, *Income Taxes* , by prescribing a more-likely-than-not threshold for financial statement recognition and measurement of a tax position taken or expected to be taken in a tax return. When uncertain tax positions exist, the Company recognizes the tax benefit of tax positions to the extent that the benefit will more likely than not be realized. The determination as to whether the tax benefit will more likely than not be realized is based upon the technical merits of the tax position as well as consideration of the available facts and circumstances. The Company evaluates uncertain tax positions on a quarterly basis and adjusts the level of the liability to reflect any subsequent changes in the relevant facts surrounding the uncertain positions. Any changes to these estimates, based on the actual results obtained and/or a change in assumptions, could impact the Company's income tax provision in future periods. Interest and penalty charges, if any, related to unrecognized tax benefits would be classified as a provision for income tax in the Company's consolidated statement of operations.

Deferred Financing Costs

Deferred financing costs include costs directly attributable to the Company's offerings of its equity securities and its debt financings. Costs attributable to equity offerings are charged against the proceeds of the offering once the offering is completed. Costs attributable to debt financings are deferred and amortized over the term of the debt using the effective interest rate method. A portion of the deferred financing cost incurred in connection with the 2022 Notes was deemed to relate to the equity component and was allocated to additional paid in capital. In accordance with ASU No. 2015-03, *Simplifying the Presentation of Debt Issuance Costs* ("ASU 2015-03"), the Company presents debt issuance costs on the balance sheet as a direct deduction from the associated debt liability. The 2026 Notes and 2022 Notes are more fully described in Note 11, *Notes Payable* , to these consolidated financial statements.

Derivative Assets and Liabilities

In June 2015, in connection with the issuance of the 2022 Notes, the Company entered into convertible note hedge transactions (the "Convertible Note Hedges"). Concurrently with entering into the Convertible Note Hedges, the Company also entered into certain warrant transactions in which it sold note hedge warrants (the "Note Hedge Warrants") to the Convertible Note Hedge counterparties to acquire 20,249,665 shares of the Company's Class A common stock, subject to customary anti-dilution adjustments (Note 12). These instruments are derivative financial instruments under ASC Topic 815, *Derivatives and Hedging* ("ASC 815").

These derivatives are recorded as assets or liabilities at fair value each reporting period and the fair value is determined using the Black-Scholes option-pricing model. The changes in fair value are recorded as a component of other (expense) income in the consolidated statements of operations. Significant inputs used to determine the fair value include the price per share of the Company's Class A common stock on the date of valuation, time to maturity of the derivative instruments, the strike prices of the derivative instruments, the risk-free interest rate, and the volatility of the Company's Class A common stock. Changes to these inputs could materially affect the valuation of the Convertible Note Hedges and Note Hedge Warrants in future periods.

Revenue Recognition

Effective January 1, 2018, the Company adopted ASU No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* and related amendments ("ASU 2014-09") using the modified retrospective transition method. The adoption of ASU 2014-09 represents a change in accounting principle that aims to more closely align revenue recognition with the delivery of the Company's products or services and will provide financial statement readers with enhanced disclosures. ASU 2014-09 also includes Subtopic 340-40, *Other Assets and Deferred Costs—Contracts with Customers* , which requires the deferral of incremental costs of obtaining a contract with a customer. In accordance with ASC Topic 606, *Revenue from Contracts with Customers* ("ASC 606"), the Company recognizes revenue when the customer obtains control of a promised good or service, in an amount that reflects the consideration which the Company expects to receive in exchange for the good or service. The reported results for the year ended December 31, 2018 reflect the application of ASC 606 guidance, while the reported results for prior periods were prepared in accordance with ASC 605, *Revenue Recognition* ("ASC 605"). Upon adoption of ASC 606, the Company concluded that no cumulative adjustment to the accumulated deficit as of January 1, 2018 was necessary. There were no remaining or ongoing deliverables or unrecognized consideration as of December 31, 2017 that required an adjustment to the accumulated deficit. The adoption of ASC 606 had no impact on the Company's consolidated statement of operations, balance sheets, or statement of cash flows.

As part of the ASC 606 adoption, the Company has utilized certain practical expedients outlined in the guidance. These practical expedients include:

- Expensing as incurred incremental costs of obtaining a contract, such as sales commissions, if the amortization period of the asset would be less than one year.
- Recognizing revenue in the amount that the Company has the right to invoice, when consideration from the customer corresponds directly with the value to the customer of the Company's performance completed to date.
- For contracts that were modified before the beginning of the earliest reporting period presented in accordance with the pending content that links to this paragraph, an entity need not retrospectively restate the contract for those contract modifications in accordance with paragraphs ASC 606-10-25-12 through 25-13. Instead, an entity shall reflect the aggregate effect of all modifications that occur before the beginning of the earliest period presented in accordance with the pending content that links to this paragraph when: a. Identifying the satisfied and unsatisfied performance obligations b. Determining the transaction price and c. Allocating the transaction price to the satisfied and unsatisfied performance obligations.

Prior to the adoption of ASC 606, the Company recognized revenue when there was persuasive evidence that an arrangement existed, services had been rendered or delivery had occurred, the price was fixed or determinable, and collection was reasonably assured.

The Company's revenues are generated primarily through collaborative arrangements and license agreements related to the research and development and commercialization of linaclotide, as well as co-promotion arrangements in the U.S. The terms of the collaborative research and development, license, co-promotion and other agreements contain multiple performance obligations which may include (i) licenses, (ii) research and development activities, including participation on joint steering committees, (iii) the manufacture of finished drug product, API, or development materials for a partner, which are reimbursed at a contractually determined rate, and (iv) co-promotion activities by the Company's clinical sales specialists. Non-refundable payments to the Company under these agreements may include (i) up-front license fees, (ii) payments for research and development activities, (iii) payments for the manufacture of finished drug product, API, or development materials, (iv) payments based upon the achievement of certain milestones, (v) payments

for sales detailing, promotional support services and medical education initiatives, and (vi) royalties on product sales. Additionally, the Company may receive its share of the net profits or bear its share of the net losses from the sale of linaclotide in the U.S. and for China, Hong Kong and Macau through its collaborations with Allergan and AstraZeneca, respectively. The Company has adopted a policy to recognize revenue net of tax withholdings, as applicable.

Revenue recognition under ASC 606

Upon executing a revenue generating arrangement, the Company assesses whether it is probable the Company will collect consideration in exchange for the good or service it transfers to the customer. To determine revenue recognition for arrangements that the Company determines are within the scope of ASC 606, it performs the following five steps: (i) identify the contract(s) with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) the Company satisfies the performance obligations. The Company must develop assumptions that require significant judgment to determine the stand-alone selling price for each performance obligation identified in the contract. The assumptions that are used to determine the stand-alone selling price may include forecasted revenues, development timelines, reimbursement rates for personnel costs, discount rates and probabilities of technical and regulatory success.

Collaboration, License, Co-Promotion and Other Commercial Agreements

Upon licensing intellectual property to a customer, the Company determines if the license is distinct from the other performance obligations identified in the arrangement. The Company recognizes revenues from the transaction price, including non-refundable, up-front fees allocated to the license when the license is transferred to the customer if the license has distinct benefit to the customer. For licenses that are combined with other promises, the Company assesses the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time. For performance obligations that are satisfied over time, the Company evaluates the measure of progress each reporting period and, if necessary, adjusts the measure of performance and related revenue recognition.

The Company's license and collaboration agreements include milestone payments, such as development and other milestones. The Company evaluates whether the milestones are considered probable of being reached and estimates the amount to be included in the transaction price using the most likely amount method at the inception of the agreement. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within the control of the Company, such as regulatory approvals, are not considered probable of being achieved until those approvals are received. The transaction price is then allocated to each performance obligation on a relative stand-alone selling price basis, for which the Company recognizes revenue as or when the performance obligations under the contract are satisfied. The Company re-evaluates the probability of achievement of such milestones and any related constraint at each reporting period, and any adjustments are recorded on a cumulative catch-up basis.

Agreements that include the supply API or drug product for either clinical development or commercial supply at the customer's discretion are generally considered as options. The Company assesses if these options provide a material right to its partner, and if so, they are accounted for as separate performance obligations. If the Company is entitled to additional payments when the customer exercises these options, any additional payments are recorded as revenue when the customer obtains control of the goods, which is typically upon shipment for sales of API and upon delivery for sales of drug product.

For agreements that include sales-based royalties, including milestone payments based on the level of sales, and the license is deemed to be the predominant item to which the royalties relate, the Company recognizes revenue when the related sales occur in accordance with the sales-based royalty exception under ASC 606-10-55-65.

Net Profit or Net Loss Sharing

In accordance with ASC 808 Topic, *Collaborative Arrangements* ("ASC 808"), the Company considered the nature and contractual terms of the arrangement and the nature of the Company's business operations to determine the classification of payments under the Company's collaboration agreements. While ASC 808 provides guidance on classification, the standard is silent on matters of separation, initial measurement, and recognition. Therefore, the

Company, consistent with its accounting policies prior to the adoption of ASC 606, applies the separation, initial measurement, and recognition principles of ASC 606 to its collaboration agreements. The Company adopted ASU No. 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606* ("ASU 2018-18") during the three months ended December 31, 2018 and confirmed that, consistent with its initial conclusions, the Company will continue to analogize to ASC 606 for further guidance on areas such as separation, initial measurement, and recognition for its existing collaborative arrangements where applicable.

The Company's collaborative arrangements revenues generated from sales of LINZESS in the U.S. are considered akin to sales-based royalties. In accordance with the sales-based royalty exception, the Company recognizes its share of the pre-tax commercial net profit or net loss generated from the sales of LINZESS in the U.S. in the period the product sales are earned, as reported by Allergan, and related cost of goods sold and selling, general and administrative expenses are incurred by the Company and its collaboration partner. These amounts are partially determined based on amounts provided by Allergan and involve the use of estimates and judgments, such as product sales allowances and accruals related to prompt payment discounts, chargebacks, governmental and contractual rebates, wholesaler fees, product returns, and co-payment assistance costs, which could be adjusted based on actual results in the future. The Company is highly dependent on Allergan for timely and accurate information regarding any net revenues realized from sales of LINZESS in the U.S. in accordance with both ASC 808 and ASC 606, and the costs incurred in selling it, in order to accurately report its results of operations. If the Company does not receive timely and accurate information or incorrectly estimates activity levels associated with the collaboration at a given point in time, the Company could be required to record adjustments in future periods.

In accordance with ASC 606-10-55, *Principal Agent Considerations* , the Company records revenue transactions as net product revenue in its consolidated statements of operations if it is deemed the principal in the transaction, which includes being the primary obligor, retaining inventory risk, and control over pricing. Given that the Company is not the primary obligor and does not have the inventory risks in the collaboration agreement with Allergan for North America, it records its share of the net profits or net losses from the sales of LINZESS in the U.S. on a net basis and presents the settlement payments to and from Allergan as collaboration expense or collaborative arrangements revenue, as applicable. The Company and Allergan settle the cost sharing quarterly, such that the Company's statement of operations reflects 50% of the pre-tax net profit or loss generated from sales of LINZESS in the U.S.

Product revenue, net

Net product revenue is derived from sales of the Lesinurad Products in the U.S. The Company sells the Lesinurad Products principally to a limited number of national wholesalers and selected regional wholesalers (the "Distributors"). The Distributors resell the Lesinurad Products to retail pharmacies and healthcare providers, who then sell to patients.

Net product revenue is recognized when the Distributor obtains control of the Company's product, which occurs at a point in time, typically upon shipment of Lesinurad Products to the Distributor. When the Company performs shipping and handling activities after the transfer of control to the Distributor (e.g., when control transfers prior to delivery), they are considered as fulfillment activities, and accordingly, the costs are accrued for when the related revenue is recognized. The Company expenses incremental costs of obtaining a contract as and when incurred if the expected amortization period of the asset that the Company would have recognized is one year or less.

The Company evaluates the creditworthiness of each of its Distributors to determine whether it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur. The Company calculates its net product revenue based on the wholesale acquisition cost that the Company charges its Distributors for the Lesinurad Products less variable consideration. The product revenue variable consideration consists of estimates relating to (i) trade discounts and allowances, such as invoice discounts for prompt payment and distributor fees, (ii) estimated government and private payor rebates, chargebacks and discounts, such as Medicaid reimbursements, (iii) reserves for expected product returns and (iv) estimated costs of incentives offered to certain indirect customers including patients. These estimates could be adjusted based on actual results in the period such variances become known.

Trade Discounts and Allowances: The Company generally provides invoice discounts on sales of Lesinurad Products to its Distributors for prompt payment and pays fees for distribution services and for certain data that Distributors provide to the Company. Consistent with historical industry practice, the Company expects its Distributors

to earn these discounts and fees, and accordingly deducts the full amount of these discounts and fees from its gross product revenues at the time such revenues are recognized.

Rebates, Chargebacks and Discounts: The Company contracts with Medicaid, other government agencies and various private organizations ("Third-party Payors") to allow for eligible purchases of the Lesinurad Products at partial or full reimbursement from such Third-party Payors. The Company estimates the rebates, chargebacks and discounts it will be obligated to provide to Third-party Payors and deducts these estimated amounts from its gross product revenue at the time the revenue is recognized. Based upon (i) the Company's contracts with these Third-party Payors, (ii) the government-mandated discounts applicable to government-funded programs, (iii) information obtained from the Company's Distributors and third-parties regarding the payor mix for Lesinurad Products and (iv) historical industry information regarding the payor mix for analog products, the Company estimates the rebates, chargebacks and discounts that it will be obligated to provide to Third-party Payors.

Product Returns: The Company estimates the amount of Lesinurad Products that will be returned and deducts these estimated amounts from its gross revenue at the time the revenue is recognized. The Company's Distributors have the right to return unopened, unprescribed Lesinurad Products beginning six months prior to the labeled expiration date and ending twelve months after the labeled expiration date. The expiration date for the Lesinurad Products is at least 24 months after it has been converted into tablet form, which is the last step in the manufacturing process for Lesinurad Products and generally occurs within a few months before Lesinurad Products are delivered to the Company. The Company currently estimates product returns based on data provided to the Company by its Distributors and by other third parties, historical industry information regarding rates for similar pharmaceutical products, the estimated remaining shelf life of the Lesinurad Products previously shipped and currently being shipped to Distributors, and contractual agreements with the Company's Distributors intended to limit the amount of inventory they maintain. Reporting from the Distributors includes Distributor sales and inventory held by Distributors, which provides the Company with visibility into the distribution channel in order to determine which products, if any, were eligible to be returned.

Other Incentives: Incentives that the Company offers include voluntary patient assistance programs, such as co-pay assistance programs which are intended to provide financial assistance to qualified commercially insured patients with prescription drug co-payments required by payors. The calculation of the accrual for co-pay assistance is based on an estimate of claims and the cost per claim that the Company expects to receive associated with product that has been recognized as revenue.

Product revenue is recorded net of the trade discounts, allowances, rebates, chargebacks, discounts, product returns, and other incentives. Certain of these adjustments are recorded as an accounts receivable reserve, while certain of these adjustments are recorded as accrued expenses.

Other

The Company produces linaclotide finished drug product, API and development materials for certain of its partners.

The Company recognizes revenue on linaclotide finished drug product, API and development materials when control have transferred to the partner, which generally occurs upon shipment for sales of API and upon delivery for sales of drug product, after the material has passed all quality testing required for collaborator acceptance. As it relates to development materials and API produced for Astellas, the Company is reimbursed at a contracted rate. Such reimbursements are considered as part of revenue generated pursuant to the Astellas license agreement and are presented as collaborative arrangements revenue. Any linaclotide finished drug product, API and development materials currently produced for Allergan for the U.S. or AstraZeneca for China, Hong Kong and Macau are recognized in accordance with the cost-sharing provisions of the Allergan and AstraZeneca collaboration agreements, respectively.

Revenue recognition prior to the adoption of ASC 606

Agreements Entered into Prior to January 1, 2011

For arrangements that include multiple deliverables and were entered into prior to January 1, 2011, the Company followed the provisions of ASC Topic 605-25, *Revenue Recognition—Multiple-Element Arrangements* (''ASC 605-25''), in accounting for these agreements. Under ASC 605-25, the Company was required to identify the deliverables included within the agreement and evaluate which deliverables represent separate units of accounting. Collaborative research and development and licensing agreements that contained multiple deliverables were divided into separate units of accounting when the following criteria were met:

- Delivered element(s) had value to the collaborator on a standalone basis,
- There was objective and reliable evidence of the fair value of the undelivered obligation(s), and
- If the arrangement included a general right of return relative to the delivered item(s), delivery or performance of the undelivered item(s) was considered probable and substantially within the Company's control.

The Company allocated arrangement consideration among the separate units of accounting either on the basis of each unit's respective fair value or using the residual method, and applied the applicable revenue recognition criteria to each of the separate units. If the separation criteria were not met, revenue of the combined unit of accounting was recorded based on the method appropriate for the last delivered item.

Agreements Entered into or Materially Modified on or after January 1, 2011 and prior to January 1, 2018

The Company evaluated revenue from multiple element agreements entered into on or after January 1, 2011 under ASU No. 2009-13, *Multiple-Deliverable Revenue Arrangements* ("ASU 2009-13"), or ASC 605, until the adoption of ASC 606. The Company also evaluated whether amendments to its multiple element arrangements were considered material modifications that were subject to the application of ASU 2009-13. This evaluation required management to assess all relevant facts and circumstances and to make subjective determinations and judgments.

When evaluating multiple element arrangements under ASU 2009-13, the Company considered whether the deliverables under the arrangement represented separate units of accounting. This evaluation required subjective determinations and required management to make judgments about the individual deliverables and whether such deliverables were separable from the other aspects of the contractual relationship. In determining the units of accounting, management evaluated certain criteria, including whether the deliverables had standalone value, based on the consideration of the relevant facts and circumstances for each arrangement. Factors considered in this determination included the research, manufacturing and commercialization capabilities of the partner and the availability of relevant research and manufacturing expertise in the general marketplace. In addition, the Company considered whether the collaborator can use the license or other deliverables for their intended purpose without the receipt of the remaining elements, and whether the value of the deliverable was dependent on the undelivered items and whether there were other vendors that could provide the undelivered items.

The consideration received was allocated among the separate units of accounting using the relative selling price method, and the applicable revenue recognition criteria were applied to each of the separate units.

The Company determined the estimated selling price for deliverables using vendor-specific objective evidence ("VSOE") of selling price, if available, third-party evidence ("TPE") of selling price if VSOE was not available, or best estimate of selling price ("BESP") if neither VSOE nor TPE was available.

Up-Front License Fees prior to January 1, 2018

When management believed the license to its intellectual property had stand-alone value, the Company generally recognized revenue attributed to the license upon delivery. When management believed the license to its intellectual property did not have stand-alone value from the other deliverables to be provided in the arrangement, it was combined with other deliverables and the revenue of the combined unit of accounting was recorded based on the method appropriate for the last delivered item.

Milestones prior to January 1, 2018

At the inception of each arrangement that included pre-commercial milestone payments, the Company evaluated whether each pre-commercial milestone was substantive, in accordance with ASU No. 2010-17, *Revenue Recognition—Milestone Method* ("ASU 2010-17"), prior to the adoption of ASC 606. This evaluation included an assessment of whether (a) the consideration was commensurate with either (1) the entity's performance to achieve the milestone, or (2) the enhancement of the value of the delivered item(s) as a result of a specific outcome resulting from the entity's performance to achieve the milestone, (b) the consideration relates solely to past performance and (c) the consideration is reasonable relative to all of the deliverables and payment terms within the arrangement. The Company evaluated factors such as the scientific, clinical, regulatory, commercial and other risks that must be overcome to achieve the respective milestone, the level of effort and investment required and whether the milestone consideration is reasonable relative to all deliverables and payment terms in the arrangement in making this assessment. At December 31, 2017, the Company had no pre-commercial milestones that were deemed substantive.

Commercial milestones were accounted for as royalties and are recorded as revenue upon achievement of the milestone, assuming all other revenue recognition criteria are met.

Net Profit or Net Loss Sharing prior to January 1, 2018

In accordance with ASC 808, and ASC 605-45, *Principal Agent Considerations* , the Company considered the nature and contractual terms of the arrangement and the nature of the Company's business operations to determine the classification of the transactions under the Company's collaboration agreements. The Company recorded revenue transactions gross in the consolidated statements of operations if it is deemed the principal in the transaction, which includes being the primary obligor and having the risks and rewards of ownership.

The Company recognized its share of the pre-tax commercial net profit or net loss generated from the sales of LINZESS in the U.S. in the period the product sales are reported by Allergan and related cost of goods sold and selling, general and administrative expenses are incurred by the Company and its collaboration partner. These amounts were partially determined based on amounts provided by Allergan and involve the use of estimates and judgments, such as product sales allowances and accruals related to prompt payment discounts, chargebacks, governmental and contractual rebates, wholesaler fees, product returns, and co-payment assistance costs, which could be adjusted based on actual results. For the periods covered in the consolidated financial statements presented, there have been no material changes to prior period estimates of revenues, cost of goods sold or selling, general and administrative expenses associated with the sales of LINZESS in the U.S.

The Company records its share of the net profits or net losses from the sales of LINZESS in the U.S. on a net basis and presents the settlement payments to and from Allergan as collaboration expense or collaborative arrangements revenue, as applicable, as the Company is not the primary obligor and does not have the risks and rewards of ownership in the collaboration agreement with Allergan for North America. The Company and Allergan settle the cost sharing quarterly, such that the Company's consolidated statements of operations reflect 50% of the pre-tax net profit or loss generated from sales of LINZESS in the U.S.

Royalties on Product Sales prior to January 1, 2018

The Company received royalty revenues under certain of the Company's license or collaboration agreements. The Company recorded these revenues as earned.

Product Revenue, Net prior to January 1, 2018

As noted above, net product revenue is derived from sales of the Lesinurad Products in the U.S.

The Company recognized net product revenue from sales of the Lesinurad Products in accordance with ASC 605, when persuasive evidence of an arrangement existed, delivery had occurred and title of the product and associated risk of loss had passed to the customer, the price was fixed or determinable, and collection from the customer was reasonably assured. ASC 605 required, among other criteria, that future returns could be reasonably estimated in order to recognize revenue.

The Company began commercializing ZURAMPIC in October 2016 and DUZALLO in October 2017 in the U.S. Initially, upon the product launch of each of the Lesinurad Products, the Company determined that it was not able to reliably make certain estimates, including returns, necessary to recognize product revenue upon delivery to Distributors. As a result, through September 30, 2017, the Company recorded net product revenue for the Lesinurad Products using a deferred revenue recognition model (sell-through). Under the deferred revenue model, the Company did not recognize revenue until the respective product was prescribed to an end-user. Accordingly, the Company recognized net product revenue when the Lesinurad Products were prescribed to the end-user, using estimated prescription demand and pharmacy demand from third party sources and the Company's analysis of third party market research data, as well as other third-party information through September 30, 2017.

During the three months ended December 31, 2017, the Company concluded it had sufficient volume of historical activity and visibility into the distribution channel, in order to reasonably make all estimates required under ASC 605 to recognize product revenue upon delivery to the Distributor. During the three months and year ended December 31, 2017, product revenue was recognized upon delivery of the Lesinurad Products to the Distributors. The Company evaluated the creditworthiness of each of its Distributors to determine whether revenue could be recognized upon delivery, subject to satisfaction of the other requirements, or whether recognition was required to be delayed until receipt of payment. In order to conclude that the price is fixed or determinable, the Company must be able to (i) calculate its gross product revenue from the sales to Distributors and (ii) reasonably estimate its net product revenue. The Company calculated gross product revenue based on the wholesale acquisition cost that the Company charged its Distributors for ZURAMPIC and DUZALLO. The Company estimated its net product revenue by deducting from its gross product revenue (i) trade discounts and allowances, such as invoice discounts for prompt payment and distributor fees, (ii) estimated government and private payor rebates, chargebacks and discounts, such as Medicaid reimbursements, (iii) reserves for expected product returns and (iv) estimated costs of incentives offered to certain indirect customers including patients. These estimates could be adjusted based on actual results in the period such variances become known.

Other

The Company supplies linaclotide finished drug product, API and development materials for certain of its partners.

The Company recognized revenue on linaclotide finished drug product, API and development materials when the material had passed all quality testing required for collaborator acceptance, delivery had occurred, title and risk of loss had transferred to the partner, the price was fixed or determinable, and collection was reasonably assured.

Cost of Revenues

Cost of revenues includes cost related to the sales of linaclotide API and drug product, as well as the cost of product revenue related to sales of the Lesinurad Products in the U.S. Cost related to the sales of linaclotide API and drug product are recognized upon shipment of linaclotide API and drug product to certain of the Company's partners outside of the U.S. The Company's cost of revenues for linaclotide consists of the internal and external costs of producing such API and drug product. Cost of product revenue related to the sales of the Lesinurad Products in the U.S. includes the cost of producing finished goods that correspond with product revenue for the reporting period, such as third-party supply and overhead costs, as well as certain period costs related to freight, packaging, stability and quality testing, and customer acquisition.

Research and Development Costs

The Company generally expenses research and development costs to operations as incurred. The Company defers and capitalizes nonrefundable advance payments made by the Company for research and development activities until the related goods are received or the related services are performed.

Research and development expenses are comprised of costs incurred in performing research and development activities, including salary, benefits and other employee-related expenses; share-based compensation expense; laboratory supplies and other direct expenses; facilities expenses; overhead expenses; third-party contractual costs relating to nonclinical studies and clinical trial activities and related contract manufacturing expenses, development of manufacturing processes and regulatory registration of third-party manufacturing facilities; licensing fees for the Company's product candidates; and other outside expenses.

The Company has collaboration agreements with Allergan for the U.S. and AstraZeneca for China, Hong Kong and Macau pursuant to which it shares research and development expenses related to linaclotide. The Company records expenses incurred under the linaclotide collaboration arrangements for such work as research and development expense. Because the collaboration arrangements are cost sharing arrangements, the Company concluded that when there is a period during the collaboration arrangements during which the Company is owed payment from Allergan or AstraZeneca for such territories, the Company records the reimbursement by Allergan or AstraZeneca for their share of the development effort as a reduction of research and development expense. Amounts owed to Allergan or AstraZeneca for such territories are recorded as incremental research and development expense.

Restructuring Expenses

The Company records costs and liabilities associated with exit and disposal activities in accordance with ASC 420, *Exit or Disposal Cost Obligations* . Such costs are based on estimates of fair value in the period liabilities are incurred. The Company evaluates and adjusts these costs as appropriate for changes in circumstances as additional information becomes available.

Selling, General and Administrative Expenses

The Company expenses selling, general and administrative costs to operations as incurred. Selling, general and administrative expense consists primarily of compensation, benefits and other employee-related expenses for personnel in the Company's administrative, finance, legal, information technology, business development, commercial, sales, marketing, communications and human resource functions. Other costs include the legal costs of pursuing patent protection of the Company's intellectual property, general and administrative related facility costs, insurance costs and professional fees for accounting and legal services.

Under the Company's AstraZeneca collaboration agreement for linaclotide, the Company is reimbursed for certain selling, general and administrative expenses and the Company nets these reimbursements against the Company's selling, general and administrative expenses as incurred. The Company includes Allergan's selling, general and administrative cost-sharing payments in the calculation of the net profits and net losses from the sale of LINZESS in the U.S. and present the net payment to or from Allergan as collaboration expense or collaborative arrangements revenue, respectively.

Share-Based Compensation

The Company's share-based compensation programs grant awards which have included stock awards, restricted stock awards ("RSAs"), restricted stock units ("RSUs"), stock options, and shares issued under our employee stock purchase plan ("ESPP"). Share-based compensation is recognized as an expense in the consolidated financial statements based on the grant date fair value over the requisite service period, net of estimated forfeitures. For awards that vest based on service conditions, the Company uses the straight-line method to allocate compensation expense to reporting periods. The grant date fair value of options granted is calculated using the Black-Scholes option-pricing model, which requires the use of subjective assumptions including volatility and expected term, among others. The fair value of the Company's stock awards, RSAs and RSUs is based on the market value of the Company's Class A common stock on the date of grant.

The Company estimates forfeitures at the time of grant and revises those estimates in subsequent periods if actual forfeitures differ from those estimates. The Company uses historical forfeiture activity to estimate pre-vesting forfeitures and records share-based compensation expense only for those awards that are expected to vest.

Compensation expense related to modified awards is measured based on the fair value for the awards as of the modification date. Any incremental compensation expense arising from the excess of the fair value of the awards on the modification date compared to the fair value of the awards immediately before the modification date is recognized at the modification date or ratably over the requisite remaining service period, as appropriate.

The Company records the expense for stock option grants subject to performance-based milestone vesting using the accelerated attribution method over the remaining service period when management determines that achievement of the milestone is probable. Management evaluates when the achievement of a performance-based milestone is probable based on the relative satisfaction of the performance conditions as of the reporting date.

Compensation expense for discounted purchases under the ESPP is measured using the Black-Scholes model to compute the fair value of the lookback provision plus the purchase discount and is recognized as compensation expense over the offering period.

While the assumptions used to calculate and account for share-based compensation awards represent management's best estimates, these estimates involve inherent uncertainties and the application of management's judgment. As a result, if revisions are made to the Company's underlying assumptions and estimates, the Company's share-based compensation expense could vary significantly from period to period.

Patent Costs

The Company incurred and recorded as operating expense legal and other fees related to patents of approximately $6.0 million, approximately $4.2 million, and approximately $2.3 million for the years ended December 31, 2018, 2017 and 2016, respectively. These costs were charged to selling, general and administrative expenses as incurred.

Contingent Consideration

In accordance with ASC 805, the Company recognizes assets acquired and liabilities assumed in business combinations, including contingent liabilities and non-controlling interest in the acquiree based on the fair value estimates as of the date of acquisition. The consideration for the Company's business acquisitions includes future payments that are contingent upon the occurrence of a particular event or events. Contingent consideration at December 31, 2018 and 2017 relates to future royalty and milestone payments based on the estimated future sales of the Lesinurad Products. The obligations for such contingent consideration payments are recorded at fair value on the acquisition date. The contingent consideration obligations are then evaluated each reporting period. Changes in the fair value of contingent consideration obligations, other than changes due to payments, are recognized as a (gain) loss on fair value remeasurement of contingent consideration in the consolidated statements of operations. Adjustments are recorded when there are changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to the Company's credit risk, which is based on the estimated cost of debt for market participants. During the year ended December 31, 2018, the Company

delivered to AstraZeneca a notice of termination of the lesinurad license agreement which resulted in an approximately $ 31.0 million decrease to the contingent consideration liability. (Note 4 and Note 6).

Net Income (Loss) Per Share

The Company calculates basic net income (loss) per common share and diluted net income (loss) per common share by dividing the net income (loss) by the weighted average number of common shares outstanding during the period. Diluted net income (loss) per common share is computed by dividing net income (loss) by the diluted number of shares outstanding during the period. Except where the result would be antidilutive to net income (loss), diluted net income (loss) per common share is computed assuming the conversion of the 2022 Notes, the exercise of outstanding common stock options and the vesting of RSUs and RSAs (using the treasury stock method), as well as their related income tax effects.

As of December 31, 2018, there were no longer any Class B common shares outstanding as all Class B common shares converted on a one-to-one basis to Class A common shares. Historically, the Company allocated undistributed earnings between the classes of common stock on a one-to-one basis when computing net income (loss) per share. As a result, historically, basic and diluted net income (loss) per Class A and Class B shares were equivalent.

Comprehensive Income (Loss)

Comprehensive income (loss) is defined as the change in equity of a business enterprise during a period from transactions, and other events and circumstances from non-owner sources and currently consists of net loss and changes in unrealized gains and losses on available-for-sale debt securities.

Subsequent Events

The Company considers events or transactions that have occurred after the balance sheet date of December 31, 2018, but prior to the filing of the financial statements with the Securities and Exchange Commission to provide additional evidence relative to certain estimates or to identify matters that require additional recognition or disclosure. Subsequent events have been evaluated through the filing of the financial statements accompanying this Annual Report on Form 10-K.

New Accounting Pronouncements

From time to time, new accounting pronouncements are issued by the FASB or other standard setting bodies that are adopted by the Company as of the specified effective date. Except as set forth below, the Company did not adopt any new accounting pronouncements during the year ended December 31, 2018 that had a material effect on its consolidated financial statements.

In May 2014, the FASB issued ASU No. 2014-09, *Revenue from Contracts with Customers* , which supersedes the revenue recognition requirements in ASC 605, and most industry-specific guidance. The new standard requires that an entity recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the Company expects to be entitled in exchange for those goods or services. The update also requires additional disclosure about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and changes in judgments and assets recognized from costs incurred to obtain or fulfill a contract. In April 2016, the FASB issued ASU No. 2016-10 *, Revenue from Contracts with Customers: Identifying Performance Obligations and Licensing* ("ASU 2016-10"), which clarifies certain aspects of identifying performance obligations and licensing implementation guidance. In May 2016, the FASB issued ASU No. 2016-12, *Revenue from Contracts with Customers: Narrow-Scope Improvements and Practical Expedients* ("ASU 2016-12"), related to disclosures of remaining performance obligations, as well as other amendments to guidance on collectability, non-cash consideration and the presentation of sales and other similar taxes collected from customers. The Company adopted these ASUs using the modified retrospective transition approach effective January 1, 2018. The adoption of these ASUs did not have a material impact on the Company's financial position or results of operations; however, adoption did result in significant changes to the Company's financial statement disclosures.

In February 2016, the FASB issued ASU No. 2016-02, *Leases* ("ASU 2016-02"), which supersedes the lease accounting requirements in ASC Topic 840, *Leases,* and most industry-specific guidance with ASC Topic 842, *Leases* .

ASU 2016-02 requires the identification of arrangements that should be accounted for as leases by lessees. In general, for lease arrangements exceeding a 12-month term, these arrangements must now be recognized as assets and liabilities on the balance sheet of the lessee. Under ASU 2016-02, a right-of-use asset and lease obligation will be recorded for all leases, whether operating or financing, while the income statement will reflect lease expense for operating leases and amortization and interest expense for financing leases. The balance sheet amount recorded for existing leases at the date of adoption of ASU 2016-02 must be calculated using the applicable incremental borrowing rate at the date of adoption. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Early adoption is permitted. In July 2018, the FASB issued ASU No. 2018-10, *Leases (Topic 842)* ("ASU 2018-10"), *Codification* Improvements and ASU No. 2018-11, *Leases (Topic 842)* ("ASU 2018-11"), to provide additional guidance for the adoption of Topic 842. ASU 2018-10 clarifies certain provisions, and corrects unintended applications of the guidance, such as the rate implicit in a lease, impairment of the net investment in a lease, lessee reassessment of lease classifications, lessor reassessment of lease term and purchase options, variable payments that depend on an index or rate and certain transition adjustments. The amendments in ASU 2018-11 will allow for an additional transition method, whereby at the adoption date the entity recognizes a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption, while the comparative period disclosures continue recognition under ASC Topic 840. Additionally, ASU 2018-11 includes a practical expedient for separating contract components for lessors. The Company's analysis includes, but is not limited to, reviewing existing leases, reviewing other service agreements for embedded leases, establishing policies and procedures, assessing potential disclosures and evaluating the impact of adoption on the Company's consolidated financial statements. The Company anticipates adopting ASC Topic 842 using the additional transition method outlined in ASU 2018-11 as of January 1, 2019. The Company expects the adoption of ASU 2016-02, ASU 2018-10, and ASU 2018-11 to have a material impact on the Company's financial position and the related footnote disclosures.

In October 2016, the FASB issued ASU No. 2016-16, *Accounting for Income Taxes: Intra-Entity Asset Transfers of Assets Other than Inventory* ("ASU 2016-16"). ASU 2016-16 eliminates the ability to defer the tax expense related to intra-entity asset transfers other than Inventory. Under the new standard, entities should recognize the income tax consequences on an intra-entity transfer of an asset other than inventory when the transfer occurs. ASU 2016-16 is effective for fiscal periods beginning after December 15, 2018. Early adoption is permitted. The Company continues to evaluate the potential impact that the adoption of ASU 2016-16 will have on the Company's financial position or results of operations. The Company does not expect the adoption of ASU 2016-16 to have a material impact on the Company's financial position or results of operations.

In October 2016, the FASB issued ASU 2016-18, *Statement of Cash Flows (Topic 230) Restricted Cash* ("ASU 2016-18"), which requires that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and restricted cash or restricted cash equivalents. Therefore, amounts described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU 2016-18 is effective for fiscal years beginning after December 15, 2017, and interim periods within those years. The Company adopted this standard during the three months ended March 31, 2018. Adoption of this standard did not have a material impact on the Company's financial position or results of operations.

As a result of adopting ASU 2016-18, the Company adjusted the consolidated statements of cash flows from previously reported amounts as follows:

	Year Ended December 31, 2017			Year Ended December 31, 2016		
	As previously reported	Adjustments	As adjusted	As previously reported	Adjustments[1]	As adjusted
Cash flows from Operating Activities:						
Net decrease (increase) in restricted cash related to lease obligations	$ 1,190	$ (1,190)	$ —	$ 500	$ (500)	$ —
Net cash flows used in operating activities	(99,563)	(1,190)	(100,753)	(25,433)	(501)	(25,934)
Net change in cash, cash equivalents, and restricted cash	71,732	(1,190)	70,542	(207,283)	(501)	(207,784)
Cash, cash equivalents, and restricted cash, beginning of period	54,004	8,246	62,250	261,287	8,747	270,034
Cash, cash equivalents, and restricted cash, end of period	$ 125,736	$ 7,056	$ 132,792	$ 54,004	$ 8,246	$ 62,250

(1) Numbers adjusted for rounding purposes.

In January 2017, the FASB issued ASU No. 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business* ("ASU 2017-01"), to clarify the definition of a business by adding guidance to assist entities with evaluating whether transactions should be accounted for as acquisitions or disposals of assets versus businesses. ASU 2017-01 is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. The Company adopted this standard during the three months ended March 31, 2018. The adoption of this standard did not have a material impact on the Company's financial position or results of operations.

In January 2017, the FASB issued ASU No. 2017-04, *Intangibles—Goodwill and Other* (Topic 350) ("ASU 2017-04") to simplify the accounting for goodwill impairment by removing Step 2 of the goodwill impairment test. ASU 2017-04 is effective for fiscal years beginning after December 15, 2019. Early adoption is permitted. The Company is evaluating the potential impact that the adoption of ASU 2017-04 may have on the Company's financial position and results of operations.

In May 2017, the FASB issued ASU No. 2017-09, *Compensation—Stock Compensation* (Topic 708) Scope of Modification Accounting ("ASU 2017-09") which provides guidance that clarifies when changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting in Topic 718. Adoption of ASU 2017-09 is required for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years. The Company adopted this standard during the three months ended March 31, 2018. The adoption of this standard did not have a material impact on the Company's financial position and results of operations.

In June 2018, the FASB issued ASU No. 2018-07, *Compensation—Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting* ("ASU 2018-07"). ASU 2018-07 simplifies the accounting for share-based payments to nonemployees by aligning with the accounting for share-based payments to employees, with certain exceptions. Measurement of equity-classified nonemployee awards issued in exchange for goods or services used or consumed in an entity's own operations will be fixed at the grant date, which may lower the cost and reduce the volatility in the income statement. Entities also may use the expected term to measure nonemployee options or elect to use the contractual term as the expected term, on an award-by-award basis. Adoption of ASU 2018-07 is required for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Early adoption is permitted, but no earlier than an entity's adoption of ASC 606. The Company is currently evaluating the potential impact that the adoption of ASU 2018-07 may have on the Company's financial position and results of operations.

In July 2018, the FASB issued ASU 2018-09, *Codification Improvements* ("ASC 2018-09"). The amendments in ASU 2018-09 affect a wide variety of Topics in the FASB codification and apply to all reporting entities within the scope of the affected accounting guidance. The Company has evaluated ASU 2018-09 in its entirety and determined that the amendments related to Topic 718-740, *Compensation—Stock Compensation—Income Taxes* , are the only provisions

that currently apply to the Company. The amendments in ASU 2018-09 related to Topic 718-740, *Compensation—Stock Compensation—Income Taxes* , clarify that an entity should recognize excess tax benefits related to stock compensation transactions in the period in which the amount of the deduction is determined. The amendments in ASU 2018-09 related to Topic 718-740 are effective for fiscal years beginning after December 15, 2018, with early adoption permitted. The Company does not expect the adoption of ASU 2018-09 to have a material impact on the Company's financial position or results of operations.

In August 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirement for Fair Value Measurement* ("ASU 2018-13") which amends the disclosure requirements for fair value measurements. The amendments in ASU 2018-13 are effective for fiscal years beginning after December 15, 2019, with early adoption permitted. The Company is currently evaluating the potential impact that the adoption of ASU 2018-13 may have on the Company's financial position and results of operations.

In August 2018, the FASB issued ASU No. 2018-15, *Intangibles—Goodwill and Other—Internal Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract (a consensus of the FASB Emerging Issues Task Force)* ("ASU 2018-15") which provides additional guidance on the accounting for costs of implementation activities performed in a cloud computing arrangement that is a service contract. ASU 2015-18 requires a customer in a cloud computing arrangement that is a service contract to follow the new internal-use software guidance to determine which implementation costs to capitalize as assets or expense as incurred. The new internal-use software guidance requires that certain costs incurred during the application development stage be capitalized and other costs incurred during the preliminary project and post-implementation stages be expensed as they are incurred. A customer's accounting for the hosting component of the arrangement is not affected by this guidance. The amendments in ASU 2018-15 are effective for fiscal years beginning after December 15, 2019, with early adoption permitted. The Company is currently evaluating the potential impact that the adoption of ASU 2018-15 may have on the Company's financial position and results of operations.

In October 2018, the FASB issued ASU No. 2018-17, *Consolidation (Topic 810): Targeted Improvements to Related Party Guidance for Variable Interest Entities* ("ASU 2018-17"). The update is intended to improve general purpose financial reporting by considering indirect interests held through related parties in common control arrangements on a proportional basis for determining whether fees paid to decision makers and service providers are variable interests. The amendments in ASU 2018-17 will be effective for fiscal years beginning after December 15, 2019, with early adoption permitted. The Company is currently evaluating the potential impact that the adoption of ASU 2018-17 may have on the Company's financial position and results of operations.

In November 2018, the FASB issued ASU No. 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606 ,* which clarifies that certain transactions between participants in a collaborative arrangement should be accounted for under ASC 606 when the counterparty is a customer. In addition, ASU 2018-18 precludes an entity from presenting consideration from a transaction in a collaborative arrangement as revenue from contracts with customers if the counterparty is not a customer for that transaction. The Company adopted ASU 2018-18 during the three months ended December 31, 2018. The adoption of ASU 2018-18 did not have a material impact on the Company's financial position or results of operations.

No other accounting standards known by the Company to be applicable to it that have been issued by the FASB or other standard-setting bodies and that do not require adoption until a future date are expected to have a material impact on the Company's consolidated financial statements upon adoption.

3. Net Loss Per Share

The following table sets forth the computation of basic and diluted net loss per common share (in thousands, except per share amounts):

	Year Ended December 31,		
	2018	2017	2016
Numerator:			
Net Loss	$ (282,368)	$ (116,937)	$ (81,708)
Denominator:			
Weighted average number of common shares used in net loss per share — basic and diluted	152,634	148,993	144,928
Net loss per share — basic and diluted	$ (1.85)	$ (0.78)	$ (0.56)

In June 2015, in connection with the issuance of approximately $335.7 million in aggregate principal amount of the 2022 Notes, the Company entered into convertible note hedge transactions. The Convertible Note Hedges are generally expected to reduce the potential dilution to the Company's Class A common stockholders upon a conversion of the 2022 Notes and/or offset any cash payments the Company is required to make in excess of the principal amount of converted 2022 Notes in the event that the market price per share of the Company's Class A common stock, as measured under the terms of the Convertible Note Hedges, is greater than the conversion price of the 2022 Notes (Note 11). The Convertible Note Hedges are not considered for purposes of calculating the number of diluted weighted average shares outstanding, as their effect would be antidilutive.

Concurrently with entering into the Convertible Note Hedges, the Company also entered into certain warrant transactions in which it sold note hedge warrants to the Convertible Note Hedge counterparties to acquire 20,249,665 shares of the Company's Class A common stock, subject to customary anti-dilution adjustments. The Note Hedge Warrants could have a dilutive effect on the Company's Class A common stock to the extent that the market price per share of the Class A common stock exceeds the applicable strike price of such warrants (Note 11). The Note Hedge Warrants are not considered for purposes of calculating the number of diluted weighted averages shares outstanding, as their effect would be antidilutive.

The following potentially dilutive securities have been excluded from the computation of diluted weighted average shares outstanding as their effect would be anti-dilutive (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Options to purchase common stock	20,457	21,086	20,455
Shares subject to repurchase	65	62	94
Unvested shares from early option exercises	—	—	300
Restricted stock units	3,058	2,277	1,299
Note hedge warrants	20,250	20,250	20,250
2022 Notes	20,250	20,250	20,250
	64,080	63,925	62,648

4. Goodwill and Intangible Assets

The Company closed a transaction with AstraZeneca (the "Lesinurad Transaction") on June 2, 2016 (the "Acquisition Date") with AstraZeneca pursuant to which the Company received an exclusive license to develop, manufacture and commercialize in the U.S. products containing lesinurad as an active ingredient, including ZURAMPIC and DUZALLO. (the "Lesinurad Products"). On August 2, 2018, the Company delivered to AstraZeneca a notice of termination of the lesinurad license agreement, which termination is made with respect to all products under the lesinurad license agreement.

The value of the developed technology – ZURAMPIC and developed technology – DUZALLO intangible assets as of the Acquisition Date was approximately $22.0 million and approximately $145.1 million, respectively. As of

December 31, 2017, accumulated amortization for developed technology – ZURAMPIC and developed technology – DUZALLO intangible assets was approximately $2.7 million and approximately $4.5 million, respectively. As of July 31, 2018, the accumulate amortization for developed technology – ZURAMPIC and developed technology – DUZALLO intangible assets was approximately $3.6 million and approximately $11.7 million, respectively.

In January 2018, the Company commenced an initiative to evaluate the optimal mix of investments for the lesinurad franchise for uncontrolled gout, including DUZALLO and ZURAMPIC. As part of this effort, in 2018, the Company began re-allocating resources within the lesinurad franchise to systematically explore a more comprehensive marketing mix in select test markets (with paired controls), while continuing to build market presence for the lesinurad franchise across the country. In July 2018, the Company obtained and analyzed the results from the lesinurad franchise test markets. Data from the test markets did not meet expectations. As a result, during the year ended December 31, 2018, in connection with the Company's revised forecast, the Company reduced its projected revenue and net cash flow assumptions associated with the value of its developed technology – ZURAMPIC and developed technology – DUZALLO intangible assets. Accordingly, the Company evaluated its developed technology – ZURAMPIC and developed technology – DUZALLO intangible assets for impairment. As a result of this triggering event requiring an impairment assessment, the Company recorded an approximately $151.8 million impairment charge during the year ended December 31, 2018 related to the write-down of the developed technology – ZURAMPIC and developed technology – DUZALLO intangible assets. The impairment assessment performed utilized the revised projected revenue and net cash flows assumed through the termination of the Lesinurad License Agreement, resulting in an impairment of the full carrying value of the intangible assets. The impairment charge was recorded as impairment of intangible assets in the Company's consolidated statement of operations.

The Company tests its goodwill for impairment annually as of October 1 st, or more frequently if events or changes in circumstances indicate an impairment may have occurred (Note 2). As of December 31, 2018, there was no impairment of goodwill.

5. Collaboration, License, Co-Promotion and Other Commercial Agreements

For the year ended December 31, 2018, the Company had linaclotide collaboration agreements with Allergan for North America and AstraZeneca for China, Hong Kong and Macau, as well as linaclotide license agreements with Astellas for Japan and with Allergan for the Allergan License Territory. The Company also had agreements with Allergan to co-promote VIBERZI in the U.S. and to promote CANASA in the U.S. The following table provides

amounts included in the Company's consolidated statements of operations as collaborative arrangements revenue and sale of API attributable to transactions from these arrangements (in thousands):

	Year Ended December 31,		
Collaborative Arrangements Revenue	**2018**	**2017**	**2016**
Linaclotide Agreements:			
Allergan (North America)	$ 266,177	$ 260,210	$ 218,880
Allergan (Europe and other)	1,146	617	406
AstraZeneca (China, Hong Kong and Macau)	—	208	370
Astellas (Japan)	—	—	38,990
Co-Promotion and Other Agreements:			
Exact Sciences (Cologuard) [1]	—	2,544	3,513
Allergan (VIBERZI)	4,290	1,535	1,764
Other	1,226	419	—
Total collaborative arrangements revenue	$ 272,839	$ 265,533	$ 263,923
Sale of API			
Linaclotide Agreements:			
Astellas (Japan)	$ 69,599	$ 29,682	$ 5,440
Allergan (North America)	—	—	4,482
Allergan (Europe and other)	—	—	3
Other [2]	756	—	—
Total sale of API	$ 70,355	$ 29,682	$ 9,925

(1) In August 2016, the Company terminated the Exact Sciences Co-Promotion Agreement for Cologuard. Under the terms of the agreement, the Company continued to receive royalty payments through July 2017.

(2) During the three months ended September 30, 2018, the Company recorded approximately $0.8 million in revenue related to the sale of API to Allergan, separate from its existing revenue agreements.

Accounts receivable, net and related party accounts receivable, net totaled approximately $80.9 million related to collaborative arrangements revenue and sale of API as of December 31, 2018, net of approximately $3.1 million related to related party accounts payable.

As of December 31, 2018, there were no impairment indicators for the accounts receivable recorded. During the year ended December 31, 2018, there was no significant unusual activity in accounts receivable.

Linaclotide Agreements

Collaboration Agreement for North America with Allergan

In September 2007, the Company entered into a collaboration agreement with Allergan to develop and commercialize linaclotide for the treatment of IBS-C, CIC and other GI conditions in North America. Under the terms of this collaboration agreement, the Company received a non-refundable, upfront licensing fee and shares equally with Allergan all development costs as well as net profits or losses from the development and sale of linaclotide in the U.S. The Company receives royalties in the mid-teens percent based on net sales in Canada and Mexico. Allergan is solely responsible for the further development, regulatory approval and commercialization of linaclotide in those countries and funding any costs. The collaboration agreement for North America also includes contingent milestone payments, as well as a contingent equity investment, based on the achievement of specific development and commercial milestones. At December 31, 2018, $205.0 million in license fees and all six development milestone payments had been received by the Company, as well as a $25.0 million equity investment in the Company's capital stock (Note 17). The Company can also achieve up to $100.0 million in a sales-related milestone if certain conditions are met, which will be recognized as collaborative arrangements revenue when it is probable that a significant reversal of revenue would not occur and the associated constraints have been lifted.

As a result of the research and development cost-sharing provisions of the linaclotide collaboration for North America, the Company offset approximately $9.0 million and recognized approximately $0.6 million in incremental research and development costs during the years ended December 31, 2018 and 2017, respectively, and offset approximately $7.3 million during the year ended December 31, 2016, to reflect the obligations of each party under the collaboration to bear half of the development costs incurred.

The Company and Allergan began commercializing LINZESS in the U.S. in December 2012. The Company receives 50% of the net profits and bears 50% of the net losses from the commercial sale of LINZESS in the U.S. Net profits or net losses consist of net sales of LINZESS to third-party customers and sublicense income in the U.S. less the cost of goods sold as well as selling, general and administrative expenses. LINZESS net sales are calculated and recorded by Allergan and may include gross sales net of discounts, rebates, allowances, sales taxes, freight and insurance charges, and other applicable deductions. If either party provided fewer calls on physicians in a particular year than it was contractually required to provide, such party's share of the net profits would be adjusted as set forth in the collaboration agreement for North America. During the years ended December 31, 2017 and 2016, these adjustments to the share of the net profits were reduced or eliminated in connection with the co-promotion activities under the Company's agreement with Allergan to co-promote VIBERZI in the U.S., as described below in *Agreement with Allergan for VIBERZI* . Additionally, these adjustments to the share of the net profits are eliminated, in full, in 2018 and all subsequent years under the terms of the Company's commercial agreement with Allergan entered into in January 2017 under which the Company promotes Allergan's CANASA product and promoted its DELZICOL product as described below in *Commercial Agreement with Allergan* .

The Company evaluated this collaboration arrangement under ASC 606 and concluded that all development-period performance obligations had been satisfied as of September 2012. However, the Company has determined that there are three remaining commercial-period performance obligations, which include the sales detailing of LINZESS, participation in the joint commercialization committee, and approved additional trials. The consideration remaining includes cost reimbursements in the U.S., as well as commercial sales-based milestones and net profit and loss sharing payments based on net sales in the U.S. Additionally, the Company receives royalties in the mid-teens percent based on net sales in Canada and Mexico. Royalties, commercial sales-based milestones, and net profit and loss sharing payments will be recorded as collaborative arrangements revenue or expense in the period earned, in accordance with the sales-based royalty exception, as these payments relate predominately to the license granted to Allergan. The Company records royalty revenue in the period earned based on royalty reports from its partner, if available, or based on the projected sales and historical trends. The cost reimbursements received from Allergan during the commercialization period will be recognized as billed in accordance with the right-to-invoice exemption, as the Company's right to consideration corresponds directly with the value of the services transferred during the commercialization period.

Under the Company's collaboration with Allergan for North America, LINZESS net sales are calculated and recorded by Allergan and include gross sales net of discounts, rebates, allowances, sales taxes, freight and insurance charges, and other applicable deductions, as noted above. These amounts include the use of estimates and judgments, which could be adjusted based on actual results in the future. The Company records its share of the net profits or net losses from the sales of LINZESS in the U.S. on a net basis less commercial expenses, and presents the settlement payments to and from Allergan as collaboration expense or collaborative arrangements revenue, as applicable. This is in accordance with the Company's policy, given that the Company is not the primary obligor and does not have the inventory risks in the collaboration agreement with Allergan for North America. The Company relies on Allergan to provide accurate and complete information related to net sales of LINZESS in accordance with U.S. GAAP in order to calculate its settlement payments to and from Allergan and record collaboration expense or collaborative arrangements revenue, as applicable.

From time to time, in accordance with the terms of the collaboration with Allergan for North America, the Company engages an independent certified public accounting firm to review the accuracy of the financial reporting from Allergan to the Company. In connection with the most recent of such reviews, during the three months ended September 30, 2018, Allergan reported to the Company an approximately $59.3 million negative adjustment to LINZESS net sales. Such adjustment relates to the cumulative difference between certain previously estimated LINZESS gross-to-net sales reserves and allowances made by Allergan during the years ended December 31, 2015, 2016 and 2017, and actual subsequent payments made. This adjustment is primarily associated with estimated governmental and contractual rebates, as reported by Allergan. Accordingly, upon receiving this information from Allergan, the Company recorded a change in accounting estimate to reduce collaborative arrangements revenue by approximately $29.7 million during the year ended December 31, 2018 related to the Company's share of this adjustment. In addition, during the three months

ended December 31, 2018, Allergan reported to the Company a true-up of approximately $0.2 million related to the previously reported adjustment for the cumulative difference between certain previously estimated LINZESS gross-to-net sales reserves and allowances.

The Company recognized collaborative arrangements revenue from the Allergan collaboration agreement for North America during the years ended December 31, 2018, 2017 and 2016 as follows (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Collaborative arrangements revenue related to sales of LINZESS in the U.S.	$ 264,243	$ 256,238	$ 217,726
Royalty revenue	1,934	2,295	1,154
Other [1]	—	1,677	—
Total collaborative arrangements revenue	$ 266,177	$ 260,210	$ 218,880

(1) Includes net profit share adjustments of approximately $1.7 million recorded during the year ended December 31, 2017 related to a change in estimated selling expenses previously recorded.

The collaborative arrangements revenue recognized in the years ended December 31, 2018, 2017 and 2016 primarily represents the Company's share of the net profits on the sale of LINZESS in the U.S.

During each of the years ended December 31, 2018 and 2017, the Company recorded no revenue related to the sale of API to Allergan under the terms of the linaclotide collaboration for North America. During the year ended December 31, 2016, the Company recorded approximately $4.5 million related to the sale of API to Allergan under the terms of the linaclotide collaboration for North America.

The following table presents the amounts recorded by the Company for commercial efforts related to LINZESS in the U.S. in the years ended December 31, 2018, 2017 and 2016 (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Collaborative arrangements revenue related to sales of LINZESS in the U.S. [1][2]	$ 264,243	$ 256,238	$ 217,726
Selling, general and administrative costs incurred by the Company [1]	(42,435)	(41,252)	(35,197)
The Company's share of net profit	$ 221,808	$ 214,986	$ 182,529

(1) Includes only collaborative arrangement revenue or selling, general and administrative costs attributable to the cost-sharing arrangement with Allergan.

(2) Certain of the unfavorable adjustments to the Company's share of the LINZESS net profits were reduced or eliminated in connection with the co-promotion activities under the Company's agreement with Allergan to co-promote VIBERZI in the U.S., as described below in *Co-Promotion Agreement with Allergan for VIBERZI* .

In May 2014, CONSTELLA became commercially available in Canada and in June 2014, LINZESS became commercially available in Mexico. The Company records royalties on sales of CONSTELLA in Canada and LINZESS in Mexico in the period earned. The Company recognized approximately $1.9 million, approximately $2.3 million, and approximately $1.2 million in royalty revenues from Canada and Mexico during the years ended December 31, 2018, 2017 and 2016, respectively.

License Agreement with Allergan (All countries other than the countries and territories of North America, China, Hong Kong, Macau, and Japan)

In April 2009, the Company entered into a license agreement with Almirall (the "European License Agreement") to develop and commercialize linaclotide in Europe (including the Commonwealth of Independent States and Turkey) for the treatment of IBS-C, CIC and other GI conditions. In October 2015, Almirall transferred its exclusive license to develop and commercialize linaclotide in Europe to Allergan. In accordance with the European License Agreement, the Company granted Almirall a right to access its U.S. Phase III clinical trial data for the purposes of supporting European regulatory approval. Additionally, the Company was required to participate on a joint development

committee during linaclotide's development period and is required to participate in a joint commercialization committee while linaclotide is commercially available.

Additionally, in October 2015, the Company and Allergan separately entered into an amendment to the European License Agreement relating to the development and commercialization of linaclotide in Europe. Pursuant to the terms of the amendment, (i) certain sales-based milestones payable to the Company under the European License Agreement were modified to increase the total milestone payments such that, when aggregated with certain commercial launch milestones, they could total up to $42.5 million, (ii) the royalties payable to the Company during the term of the European License Agreement were modified such that the royalties based on sales volume in Europe begin in the mid-single digit percent and escalate to the upper-teens percent by calendar year 2019, and (iii) Allergan assumed responsibility for the manufacturing of linaclotide API for Europe from the Company, as well as the associated costs. The Company concluded that the 2015 amendment to the European License Agreement was not a modification to the linaclotide collaboration agreement with Allergan for North America.

In January 2017, concurrently with entering into the commercial agreement as described below in *Commercial Agreement with Allergan* , the Company and Allergan entered into an amendment to the European License Agreement. The European License Agreement, as amended (the "Allergan License Agreement"), extended the license to develop and commercialize linaclotide in all countries other than China, Hong Kong, Macau, Japan, and the countries and territories of North America. On a country-by-country and product-by-product basis in such additional territory, Allergan is obligated to pay the Company a royalty as a percentage of net sales of products containing linaclotide as an active ingredient in the upper-single digits for five years following the first commercial sale of a linaclotide product in a country, and in the low-double digits thereafter. The royalty rate for products in the expanded territory will decrease, on a country-by-country basis, to the lower-single digits, or cease entirely, following the occurrence of certain events. Allergan is also obligated to assume certain purchase commitments for quantities of linaclotide API under the Company's agreements with third-party API suppliers. The amendment to the European License Agreement did not modify any of the milestones or royalty terms related to Europe.

The Company concluded that the 2017 amendment was a material modification to the European License Agreement; however, this modification did not have a material impact on the Company's consolidated financial statements as there was no deferred revenue associated with the European License Agreement. The Company also concluded that the 2017 amendment to the European License Agreement was not a material modification to the linaclotide collaboration agreement with Allergan for North America. The Company's conclusions on deliverables under ASC Topic 605-25, Revenue Recognition—Multiple-Element Arrangements ("ASC 605-25") are described below in *Commercial Agreement with Allergan* .

The Company evaluated the European License Agreement under ASC 606. In evaluating the terms of the 2009 European License Agreement under ASC 606, the Company determined that there are no remaining performance obligations as of September 2012. However, the Company continues to be eligible to receive consideration in the form of commercial launch milestones, sales-based milestones, and royalties.

The commercial launch milestones, sales-based milestones and royalties under the European License Agreement have historically been recognized as revenue as earned. Under ASC 606, the Company will apply the sales-based royalty exception to royalties and sales-based milestones, as these payments relate predominantly to the license granted to Allergan (formerly Almirall). Accordingly, the royalties and sales-based milestones will be recorded as revenue in the period earned. The Company records royalties on sales of CONSTELLA in Europe in the period earned based on royalty reports from its partner, if available, or the projected sales and historical trends. The commercial launch milestones will be recognized as revenue when it is probable that a significant reversal of revenue would not occur and the associated constraint has been lifted.

Additionally, the Company evaluated the terms of the January 2017 amendment under ASC 606 and determined that it would be treated as a separate contract given that it adds a distinct good or service at an amount that reflects standalone selling price. The Company determined that all performance obligations in this amendment were satisfied in January 2017 when the license for the additional territory was transferred. The Company continues to receive royalties under this agreement, which are recorded in the period earned pursuant to the sales-based royalty exception, as they related predominantly to the license granted to Allergan.

The Company recognized approximately $1.1 million, approximately $0.6 million and approximately $0.4 million of royalty revenue during the years ended December 31, 2018, 2017 and 2016, respectively.

License Agreement for Japan with Astellas

In November 2009, the Company entered into a license agreement with Astellas, as amended, to develop and commercialize linaclotide for the treatment of IBS-C, CIC and other GI conditions in Japan. Astellas is responsible for all activities relating to development, regulatory approval and commercialization in Japan as well as funding the associated costs and the Company is required to participate on a joint development committee over linaclotide's development period. During the year ended December 31, 2017, the Company and Astellas entered into a commercial API supply agreement (the "Astellas Commercial Supply Agreement"). Pursuant to the Astellas Commercial Supply Agreement, the Company sells linaclotide API supply to Astellas at a contractually defined rate and recognizes related revenue as sale of API. Under the license agreement, the Company receives royalties which escalate based on sales volume, beginning in the low-twenties percent, less the transfer price paid for the API included in the product actually sold and other contractual deductions.

In 2009, Astellas paid the Company a non-refundable, up-front licensing fee of $30.0 million, which was recognized as collaborative arrangements revenue on a straight-line basis over the Company's estimate of the period over which linaclotide was developed under the license agreement in accordance with ASC 605. The development period was completed in December 2016 upon approval of LINZESS by the Japanese Ministry of Health, Labor and Welfare at which point all previously deferred revenue under the agreement was recognized.

The agreement also includes three development milestone payments that totaled up to $45.0 million, all of which were achieved and recognized as revenue through December 31, 2016 in accordance with ASC 605. The first milestone payment, consisting of $15.0 million upon enrollment of the first study subject in a Phase III study for linaclotide in Japan, was achieved in November 2014. The second milestone payment, consisting of $15.0 million upon filing of a New Drug Application ("NDA") for linaclotide with the Japanese Ministry of Health, Labor and Welfare, was achieved in February 2016. The third development milestone payment consisting of $15.0 million upon approval of an NDA by the Japanese Ministry of Health, Labor and Welfare to market linaclotide in Japan was achieved in December 2016.

The Company has evaluated the terms of the 2009 License Agreement with Astellas under ASC 606 and has determined that there are no remaining performance obligations as of December 2016. However, there continues to be consideration in the form of royalties on sales of LINZESS in Japan under the 2009 License Agreement. Upon adoption of ASC 606, the Company concluded that the royalties on sales of LINZESS in Japan relate predominantly to the license granted to Astellas. Accordingly, the Company applies the sales-based royalty exception and records royalties on sales of LINZESS in Japan in the period earned based on royalty reports from its partner, if available, or the projected sales and historical trends.

Additionally, under the terms of the Astellas Commercial Supply Agreement, the Company continues to have an ongoing performance obligation to supply API. Upon adoption of ASC 606, product revenue is recognized when the customer obtains control of the Company's product, which occurs at a point in time, typically upon shipment of the product to the customer. This results in earlier revenue recognition than the Company's historical accounting.

The royalty on sales of LINZESS in Japan during the year ended December 31, 2017 relating to the quarters in arrears did not exceed the transfer price of API sold and other contractual deductions during the periods. During the years ended December 31, 2018, 2017, and 2016, the Company recognized approximately $69.6 million, approximately $29.7 million, and approximately $5.4 million, respectively, from the sale of API to Astellas under the license agreement and the Astellas Commercial Supply Agreement. During the year ended December 31, 2016, the Company recognized approximately $39.0 million in collaborative arrangements revenue from the Astellas license agreement.

Collaboration Agreement for China, Hong Kong and Macau with AstraZeneca

In October 2012, the Company entered into a collaboration agreement with AstraZeneca (the "AstraZeneca Collaboration Agreement") to co-develop and co-commercialize linaclotide in China, Hong Kong and Macau (the "License Territory"). The collaboration provides AstraZeneca with an exclusive nontransferable license to exploit the underlying technology in the License Territory. The parties share responsibility for continued development and

commercialization of linaclotide under a joint development plan and a joint commercialization plan, respectively, with AstraZeneca having primary responsibility for the local operational execution.

The parties agreed to an Initial Development Plan ("IDP") which includes the planned development of linaclotide in China, including the lead responsibility for each activity and the related internal and external costs. The IDP indicates that AstraZeneca is responsible for a multinational Phase III clinical trial (the "Phase III Trial"), the Company is responsible for nonclinical development and supplying clinical trial material and both parties are responsible for the regulatory submission process. The IDP indicates that the party specifically designated as being responsible for a particular development activity under the IDP shall implement and conduct such activities. The activities are governed by a Joint Development Committee ("JDC"), with equal representation from each party. The JDC is responsible for approving, by unanimous consent, the joint development plan and development budget, as well as approving protocols for clinical studies, reviewing and commenting on regulatory submissions, and providing an exchange of data and information.

The AstraZeneca Collaboration Agreement will continue until there is no longer a development plan or commercialization plan in place, however, it can be terminated by AstraZeneca at any time upon 180 days' prior written notice. Under certain circumstances, either party may terminate the AstraZeneca Collaboration Agreement in the event of bankruptcy or an uncured material breach of the other party. Upon certain change in control scenarios of AstraZeneca, the Company may elect to terminate the AstraZeneca Collaboration Agreement and may re-acquire its product rights in a lump sum payment equal to the fair market value of such product rights.

In connection with the AstraZeneca Collaboration Agreement, the Company and AstraZeneca also executed a co-promotion agreement (the "Co-Promotion Agreement"), pursuant to which the Company utilized its existing sales force to co-promote NEXIUM ® (esomeprazole magnesium), one of AstraZeneca's products, in the U.S. The Co-Promotion Agreement expired in May 2014.

There are no refund provisions in the AstraZeneca Collaboration Agreement and the Co-Promotion Agreement (together, the "AstraZeneca Agreements").

Under the terms of the AstraZeneca Collaboration Agreement, the Company received a $25.0 million non-refundable up-front payment upon execution. The Company is also eligible for $125.0 million in additional commercial milestone payments contingent on the achievement of certain sales targets. The parties will also share in the net profits and losses associated with the development and commercialization of linaclotide in the License Territory, with AstraZeneca receiving 55% of the net profits or incurring 55% of the net losses until a certain specified commercial milestone is achieved, at which time profits and losses will be shared equally thereafter.

Activities under the AstraZeneca Agreements were evaluated in accordance with ASC 605-25, to determine if they represented a multiple element revenue arrangement. The Company identified the following deliverables in the AstraZeneca Agreements:

- an exclusive license to develop and commercialize linaclotide in the License Territory (the "License Deliverable") (the deliverable was completed upon execution and all associated revenue was recognized as of December 31, 2016),
- research, development and regulatory services pursuant to the IDP, as modified from time to time (the "R&D Services"),
- JDC services,
- obligation to supply clinical trial material, and
- co-promotion services for AstraZeneca's product (the "Co-Promotion Deliverable") (the deliverable was completed and all associated revenue was recognized as of December 31, 2013).

Under ASC 605, the License Deliverable is nontransferable and has certain sublicense restrictions. The Company determined that the License Deliverable had standalone value as a result of AstraZeneca's internal product development and commercialization capabilities, which would enable it to use the License Deliverable for its intended

purposes without the involvement of the Company. The remaining deliverables were deemed to have standalone value based on their nature and all deliverables met the criteria to be accounted for as separate units of accounting under ASC 605-25. Factors considered in this determination included, among other things, whether any other vendors sell the items separately and if the customer could use the delivered item for its intended purpose without the receipt of the remaining deliverables.

The Company performs R&D services and JDC services and supplies clinical trial materials during the estimated development period. All consideration allocated to such services was being recognized as a reduction of research and development costs, using the proportional performance method, by which the amounts are recognized in proportion to the costs incurred in accordance with ASC 605. At the inception of the arrangement, the Company identified the supply of linaclotide drug product for commercial requirements and commercialization services as contingent deliverables under ASC 605 because these services are contingent upon the receipt of regulatory approval to commercialize linaclotide in the License Territory, and there were no binding commitments or firm purchase orders pending for commercial supply at the inception of the AstraZeneca Collaboration Agreement.

In August 2014, the Company and AstraZeneca, through the JDC, modified the IDP and development budget to include approximately $14.0 million in additional activities over the remaining development period, to be shared by the Company and AstraZeneca under the terms of the AstraZeneca Collaboration Agreement. These additional activities serve to support the continued development of linaclotide in the License Territory, including the Phase III Trial. Pursuant to the terms of the modified IDP and development budget, certain of the Company's deliverables were modified, specifically the R&D Services and the obligation to supply clinical trial material. The modification did not, however, have a material impact on the Company's consolidated financial statements.

The total amount of the non-contingent consideration allocable to the AstraZeneca Agreements was approximately $34.0 million ("Arrangement Consideration") which includes the $25.0 million non-refundable up-front payment and approximately $9.0 million representing 55% of the costs for clinical trial material supply services and research, development and regulatory activities allocated to the Company in the IDP or as approved by the JDC in subsequent periods.

The Company allocated the Arrangement Consideration to the non-contingent deliverables based on management's best estimated selling price ("BESP") of each deliverable using the relative selling price method, as the Company did not have vendor-specific objective evidence or third-party evidence of selling price for such deliverables. Of the total Arrangement Consideration, approximately $29.7 million was allocated to the License Deliverable, approximately $1.8 million to the R&D Services, approximately $0.1 million to the JDC services, approximately $0.3 million to the clinical trial material supply services, and approximately $2.1 million to the Co-Promotion Deliverable in the relative selling price model.

Because the Company shares development costs with AstraZeneca, payments from AstraZeneca with respect to both research and development and selling, general and administrative costs incurred by the Company prior to the commercialization of linaclotide in the License Territory are recorded as a reduction in expense, in accordance with the Company's policy, which is consistent with the nature of the cost reimbursement. Development costs incurred by the Company that pertain to the joint development plan and subsequent amendments to the joint development plan, as approved by the JDC, are recorded as research and development expense as incurred. Payments to AstraZeneca are recorded as incremental research and development expense. As a result of the cost-sharing arrangements under the collaboration, the Company recognized approximately $0.3 million in incremental research and development costs during the year ended December 31, 2017 and recognized an insignificant reduction in incremental research and development costs during the year ended December 31, 2016.

In March 2017, the Company began providing supply of linaclotide drug product and certain commercialization-related services pursuant to the AstraZeneca Collaboration Agreement. During the year ended December 31, 2017, the Company recognized approximately $0.2 million as collaborative arrangements revenue related to linaclotide drug product, as this deliverable was no longer contingent.

Upon the adoption of ASC 606, the Company reevaluated the AstraZeneca Agreements and, consistent with its conclusions under ASC 605, identified six performance obligations including the license, R&D services, JDC services, supply of clinical trial material, co-promotion services for NEXIUM, and the JCC services. The Company determined

that the supply of linaclotide drug product for commercial requirements was an optional service at inception of the arrangement and did not provide a material right to AstraZeneca.

At the ASC 606 adoption date, the Company had fully satisfied its obligation to transfer the license and NEXIUM co-promotion services to AstraZeneca. The following remaining performance obligations are ongoing as of December 31, 2018:

- research, development and regulatory services pursuant to the IDP, as modified from time to time (the R&D Services),
- JDC services, and
- obligation to supply clinical trial material, and
- JCC services

Under ASC 606, the Company applied the contract modification practical expedient to the August 2014 amendment, which expanded the scope of the Company's activities under the IDP and increased the development budget. This practical expedient allows an entity to reflect the aggregate effect of all modifications that occur before the beginning of the earliest period presented. The application of this practical expedient resulted in a total transaction price of approximately $34.0 million, which was allocable to the Company's performance obligations on a relative standalone selling price ("SSP") basis.

Under ASC 606, amounts of consideration allocated to the license and NEXIUM co-promotion services would have been recognized in full prior to adoption as these performance obligations were satisfied in October 2012 and December 2013, respectively. Consideration allocated to the R&D Services will be recognized as such services are provided over the performance period using an output method based on full-time employee hours incurred. Consideration allocated to the JDC services are recognized ratably over the development period using a time-based, straight-line attribution model. Revenue from the supply of clinical trial material is recognized as the clinical trial material is delivered to the customer. During the year ended December 31, 2018, the Company offset approximately $1.2 million related to R&D Services and JDC services.

Upon commercialization, the Company's only remaining performance obligation will be JCC services. During commercialization, the Company will be entitled to receive sales-based milestone payments from AstraZeneca. Additionally, the parties will share in the net profits and losses associated with the development and commercialization of linaclotide in the License Territory, with AstraZeneca receiving 55% of the net profits or incurring 55% of the net losses until a certain specified commercial milestone is achieved; from that point, profits and losses will be shared equally thereafter. Commercial sales-based milestones and net profit and loss sharing payments will be recorded as collaborative arrangements revenue or expense in the period earned, in accordance with the sales-based royalty exception, as these payments related predominately to the license granted to AstraZeneca. Any cost reimbursements received from AstraZeneca during the commercialization period will be recognized as billed in accordance with the right-to-invoice exemption, as the Company's right to consideration corresponds directly with the value of the services transferred during the commercialization period. During the year ended December 31, 2018, the Company incurred approximately $0.9 million related to pre-launch commercial services and supply chain services.

Co-Promotion and Other Agreements

Co-Promotion Agreement with Exact Sciences Corp. for Cologuard

In March 2015, the Company and Exact Sciences entered into an agreement to co-promote Exact Sciences' Cologuard, the first and only FDA-approved noninvasive stool DNA screening test for colorectal cancer (the "Exact Sciences Co-Promotion Agreement"). The Exact Sciences Co-Promotion Agreement was terminated by the parties in August 2016. Under the terms of the non-exclusive Exact Sciences Co-Promotion Agreement, the Company's sales team promoted and educated health care practitioners regarding Cologuard through July 2016. Exact Sciences maintained responsibility for all other aspects of the commercialization of Cologuard outside of the co-promotion. Under the terms of the Exact Sciences Co-Promotion Agreement, the Company was compensated primarily via royalties earned on the

net sales of Cologuard generated from the healthcare practitioners on whom the Company called with such royalties payable through July 2017. There were no refund provisions in the Exact Sciences Co-Promotion Agreement.

During the years ended December 31, 2017 and 2016, the Company recognized approximately $2.5 million, and approximately $3.5 million as collaborative arrangements revenue related to this arrangement in accordance with ASC 605-25.

The Company determined that the Exact Sciences Co-Promotion Agreement was completed prior to the adoption of ASC 606 and accordingly did not reevaluate the terms of the agreement.

Agreement with Allergan for VIBERZI

In August 2015, the Company and Allergan entered into an agreement for the co-promotion of VIBERZI in the U.S., Allergan's treatment for adults suffering from IBS-D (the "VIBERZI Co-Promotion Agreement"). Under the terms of the VIBERZI Co-Promotion Agreement, the Company's clinical sales specialists detailed VIBERZI to the same health care practitioners to whom they detail LINZESS. Allergan was responsible for all costs and activities relating to the commercialization of VIBERZI outside of the co-promotion. The Company's promotional efforts under the non-exclusive co-promotion began when VIBERZI became commercially available in December 2015. The VIBERZI Co-Promotion Agreement was effective through December 31, 2017.

Under the terms of the VIBERZI Co-Promotion Agreement, the Company's promotional efforts were compensated based on the volume of calls delivered by the Company's sales force, with the terms of the agreement reducing or eliminating certain of the unfavorable adjustments to the Company's share of net profits stipulated by the linaclotide collaboration agreement with Allergan for North America, provided that the Company provided a minimum number of VIBERZI calls on physicians. The Company provided the minimum number of VIBERZI calls on physicians pursuant to the VIBERZI Co-Promotion Agreement, and was compensated with the elimination of certain of the unfavorable adjustments to the Company's share of net profits stipulated by the linaclotide collaboration agreement with Allergan for North America for the years ending December 31, 2015, 2016 and 2017.

In connection with these co-promotion activities, the net profit share adjustments payable to Allergan under the linaclotide collaboration agreement for North America were reduced by approximately $11.0 million and approximately $5.3 million during the years ended December 31, 2017 and 2016, respectively. During the years ended December 31, 2017 and 2016, the Company also recognized approximately $1.5 million and approximately $1.8 million in revenue related to the VIBERZI Co-Promotion Agreement for the performance of medical education services.

In December 2017, the Company and Allergan entered into an amendment to the commercial agreement with Allergan (the "VIBERZI Amendment"), as described below, to include the VIBERZI promotional activities through December 31, 2018. Under the terms of the VIBERZI Amendment, the Company's clinical sales specialists will continue detailing VIBERZI in the second position to the same health care practitioners to whom they detail LINZESS in the first position and provide certain medical education services. The Company has the potential to achieve a milestone payment of up to $7.5 million based on the net sales of VIBERZI during 2018, and will be compensated approximately $3.0 million over the term of the agreement for its medical education initiatives. The Company evaluated the VIBERZI Amendment in accordance with ASC 606 and determined that it would be treated as a separate contract because it adds a distinct good or service at an amount that reflects standalone selling price. The following performance obligations under the VIBERZI Amendment were identified:

- sales detailing of VIBERZI in either first or second position, and
- medical education services

The sales-based milestone payment will be recognized as collaborative arrangements revenue when it is probable that a significant reversal of revenue would not occur and the associated constraint has been lifted. During the three months ended December 31, 2018, the Company determined that the sales-based milestone was no longer constrained and recognized approximately $1.3 million as collaborative arrangements revenue. The Company recognized approximately $3.0 million of collaborative arrangements revenue related to VIBERZI for medical education events. In December 2018, the Company further amended the VIBERZI Amendment to continue sales detailing activities in 2019.

Commercial Agreement with Allergan

In January 2017, concurrently with entering into the amendment to the European License Agreement, the Company and Allergan entered into an agreement under which the adjustments to the Company's or Allergan's share of the net profits under the share adjustment provision of the collaboration agreement for linaclotide in North America relating to the contractually required calls on physicians in each year are eliminated, in full, in 2018 and all subsequent years (the "Commercial Agreement"). Pursuant to the Commercial Agreement, Allergan appointed the Company, on a non-exclusive basis, to promote CANASA, approved for the treatment of ulcerative proctitis, and DELZICOL, approved for the treatment of ulcerative colitis, in the U.S. for approximately two years through February 2019. Under the terms of the Commercial Agreement, the Company is obligated to perform third position sales details and offer samples of such products to gastroenterology prescribers who are on the then-current call panel for LINZESS to which the Company provides first or second position details. The Company purchases samples of CANASA and DELZICOL from Allergan at the actual manufacturing cost. On a product-by-product basis, Allergan pays the Company a royalty in the mid-teens on incremental sales of CANASA and DELZICOL above a mutually agreed upon sales baseline. Additionally, the Company may incur a detailing shortfall penalty if it fails to meet the annual target product detail amount in any calendar year.

In December 2017, the Company and Allergan entered into the VIBERZI Amendment to the Commercial Agreement, as described above, to include and extend the VIBERZI promotional activities through December 31, 2018 and discontinue the promotion of DELZICOL effective January 1, 2018. Accordingly, promotional activities for DELZICOL terminated on December 31, 2017 and, subject to the Company's or Allergan's rights of early termination, the promotional activities for CANASA will terminate on February 26, 2019. The share adjustment relief will, in the case of Allergan's termination for convenience and certain other specified circumstances, survive termination of the commercial agreement. Under ASC 605, the Company concluded that the commercial agreement with Allergan, as amended, was not a material modification to the linaclotide collaboration agreement with Allergan for North America.

Activities under the Commercial Agreement with Allergan and the Allergan License Agreement were evaluated in accordance with ASC 605-25 upon execution, as the agreements were entered into concurrently, to determine if they represented a multiple element revenue arrangement.

The Company identified the following deliverables:

• an exclusive license to develop and commercialize linaclotide in the Allergan License Territory, and

• sales detailing services for CANASA and DELZICOL.

The exclusive license for the Allergan License Territory is nontransferable and has certain sublicense restrictions. The Company determined that Allergan had the internal product development and commercialization capabilities that would enable Allergan to use the license for its intended purposes without the involvement of the Company and, therefore, the license had standalone value. The deliverable for the sales detailing services for CANASA and DELZICOL was deemed to have standalone value based on the nature of the services, and all deliverables met the criteria to be accounted for as separate units of accounting under ASC 605-25. There was no allocable arrangement consideration at the inception of the arrangement, as the consideration is in the form of royalties and the elimination of a contingent liability. During the year ended December 31, 2017, the Company did not recognize royalty revenue related to the Commercial Agreement with Allergan to promote CANASA and DELZICOL.

Upon adoption of ASC 606, the Company evaluated the commercial agreement and the amendment to the European License Agreement under the contract combination and contract modification guidance in ASC 606. The Company determined that the agreements should be accounted for as separate contracts because each agreement adds distinct goods or services at an amount that reflects standalone selling price. The Company concluded that the CANASA and DELZICOL sales detailing deliverable under ASC 605 was also considered a performance obligation in accordance with ASC 606. Accordingly, the Company records royalties on sales of CANASA and any estimated detailing shortfall penalty over the period of performance for the sales details; collaborative arrangements revenue is recognized when it is probable that a significant reversal of revenue would not occur and the associated constraint has been lifted. The Company estimates sales detailing royalties based on royalty reports from its partner, if available, or the projected sales and historical trends. At the inception of the arrangement, the consideration associated with the agreement comprised of royalties and a sales detailing shortfall penalty are fully constrained. During the year ended December 31, 2018, the

Company did not recognize royalty revenue related to the Commercial Agreement with Allergan for sales of CANASA. As discussed above, the Company's obligation to perform sales detailing for DELZICOL was eliminated through the VIBERZI Amendment to the Commercial Agreement with Allergan.

The VIBERZI Amendment was effective as of January 1, 2018 and evaluated in accordance with ASC 606 as described above.

In December 2018, the Company and Allergan entered into an agreement to discontinue the Company's promotion of CANASA effective December 31, 2018, and to extend the Company's promotion of VIBERZI through March 31, 2019.

Other Collaboration and License Agreements

The Company has other collaboration and license agreements that are not individually significant to its business. Pursuant to the terms of one agreement, the Company was required to pay $7.5 million for development milestones, all of which had been paid as of December 31, 2018. The Company may also be required to pay up to $18.0 million for regulatory milestones, none of which had been paid as of December 31, 2018. The Company recorded approximately $5.0 million in research and development expense associated with the Company's other collaboration and license agreements during the year ended December 31, 2018. The Company did not record any research and development expense associated with the Company's other collaboration and license agreements during the years ended December 31, 2017 and 2016.

6. Fair Value of Financial Instruments

The tables below present information about the Company's assets that are measured at fair value on a recurring basis as of December 31, 2018 and 2017 and indicate the fair value hierarchy of the valuation techniques the Company utilized to determine such fair value. In general, fair values determined by Level 1 inputs utilize observable inputs such as quoted prices in active markets for identical assets or liabilities. Fair values determined by Level 2 inputs utilize data points that are either directly or indirectly observable, such as quoted prices for similar instruments in active markets, interest rates and yield curves. Fair values determined by Level 3 inputs utilize unobservable data points in which there is little or no market data, which require the Company to develop its own assumptions for the asset or liability.

The Company's investment portfolio includes fixed income securities that do not always trade on a daily basis. As a result, the pricing services used by the Company apply other available information as applicable through processes such as benchmark yields, benchmarking of like securities, sector groupings and matrix pricing to prepare valuations. In addition, model processes are used to assess interest rate impact and develop prepayment scenarios. These models take into consideration relevant credit information, perceived market movements, sector news and economic events. The inputs into these models may include benchmark yields, reported trades, broker-dealer quotes, issuer spreads and other relevant data. The Company validates the prices provided by its third party pricing services by obtaining market values from other pricing sources and analyzing pricing data in certain instances. The Company also invests in certain reverse repurchase agreements which are collateralized by deposits in the form of Government Securities and Obligations for an amount not less than 102% of their principal amount. The Company does not record an asset or liability for the collateral as the Company is not permitted to sell or re-pledge the collateral. The collateral has at least the prevailing credit rating of U.S. Government Treasuries and Agencies. The Company utilizes a third party custodian to manage the exchange of funds and ensure that collateral received is maintained at 102% of the reverse repurchase agreements principal amount on a daily basis.

The following tables present the assets and liabilities the Company has measured at fair value on a recurring basis (in thousands):

		Fair Value Measurements at Reporting Date Using		
	December 31, 2018	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash and cash equivalents:				
Money market funds	$ 142,218	$ 142,218	$ —	$ —
Repurchase agreements	30,875	30,875	—	—
Convertible Note Hedges	41,020	—	—	41,020
Total assets measured at fair value	$ 214,113	$ 173,093	$ —	$ 41,020
Liabilities:				
Note Hedge Warrants	$ 33,763	$ —	$ —	$ 33,763
Contingent Consideration	51	—	—	51
Total liabilities measured at fair value	$ 33,814	$ —	$ —	$ 33,814

		Fair Value Measurements at Reporting Date Using		
	December 31, 2017	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash and cash equivalents:				
Money market funds	$ 44,311	$ 44,311	$ —	$ —
U.S. Treasury securities	11,991	11,991	—	—
Repurchase agreements	70,000	70,000	—	—
Available-for-sale securities:				
U.S. Treasury securities	64,343	64,343	—	—
U.S. government-sponsored securities	31,336	—	31,336	—
Convertible Note Hedges	108,188	—	—	108,188
Total assets measured at fair value	$ 330,169	$ 190,645	$ 31,336	$ 108,188
Liabilities:				
Note Hedge Warrants	$ 92,188	$ —	$ —	$ 92,188
Contingent Consideration	31,258	—	—	31,258
Total liabilities measured at fair value	$ 123,446	$ —	$ —	$ 123,446

There were no transfers between fair value measurement levels during the years ended December 31, 2018 or 2017.

Cash equivalents, accounts receivable, related party accounts receivable, prepaid expenses and other current assets, accounts payable, related party accounts payable, accrued expenses and the current portion of capital lease obligations at December 31, 2018 and 2017 are carried at amounts that approximate fair value due to their short-term maturities.

Convertible Note Hedges and Note Hedge Warrants

The Company's Convertible Note Hedges and the Note Hedge Warrants are recorded as derivative assets and liabilities, and are classified as Level 3 under the fair value hierarchy. These derivatives are not actively traded and are valued using the Black-Scholes option-pricing model which requires the use of subjective assumptions. Significant inputs used to determine the fair value as of December 31, 2018 included the price per share of the Company's Class A common stock, time to maturity of the derivative instruments, the strike prices of the derivative instruments, the risk-free interest rate, and the volatility of the Company's Class A common stock. The Company has not paid and does not anticipate paying cash dividends on its shares of common stock in the foreseeable future; therefore, the expected

dividend yield is assumed to be zero. Changes to these inputs could materially affect the valuation of the Convertible Note Hedges and Note Hedge Warrants.

The following inputs were used in the fair market valuation of the Convertible Note Hedges and Note Hedge Warrants as of December 31, 2018 and 2017:

	Year Ended December 31, 2018		Year Ended December 31, 2017	
	Convertible Note Hedges	Note Hedge Warrants	Convertible Note Hedges	Note Hedge Warrants
Risk-free interest rate [1]	2.5 %	2.5 %	2.1 %	2.2 %
Time to maturity	3.5	4.1	4.5	5.0
Stock price [2]	$ 10.36	$ 10.36	$ 14.99	$ 14.99
Strike price [3]	$ 16.58	$ 21.50	$ 16.58	$ 21.50
Common stock volatility [4]	43.8 %	43.6 %	44.1 %	44.1 %
Dividend yield	— %	— %	— %	— %

(1) Based on U.S. Treasury yield curve, with terms commensurate with the terms of the Convertible Note Hedges and the Note Hedge Warrants
(2) The closing price of the Company's Class A common stock on the last trading days of the years ended December 31, 2018 and 2017, respectively.
(3) As per the respective agreements for the Convertible Note Hedges and Note Hedge Warrants.
(4) Selected volatility based on historical volatility of the Company's Class A common stock.

The Convertible Note Hedges and the Note Hedge Warrants are recorded at fair value at each reporting period and changes in fair value are recorded in other expense, net within the Company's consolidated statements of operations. Gains and losses for these derivative financial instruments are presented separately in the Company's consolidated statements of cash flows.

The following table reflects the change in the Company's Level 3 convertible note derivatives from December 31, 2016 through December 31, 2018 (in thousands):

	Convertible Note Hedges	Note Hedge Warrants
Balance at December 31, 2016	$ 132,521	$ (113,237)
Change in fair value, recorded as a component of gain (loss) on derivatives	(24,333)	21,049
Balance at December 31, 2017	$ 108,188	$ (92,188)
Change in fair value, recorded as a component of gain (loss) on derivatives	(67,168)	58,425
Balance at December 31, 2018	$ 41,020	$ (33,763)

Contingent Consideration

In connection with the Lesinurad Transaction, the Company recorded a liability of $67.9 million as of the Acquisition Date. This valuation was based on a Monte-Carlo simulation, which includes significant estimates related to probability weighted net cash outflow projections, primarily comprised of estimated future royalty and milestone payments to AstraZeneca, discounted using a yield curve equivalent to the Company's credit risk, which was the estimated cost of debt financing for market participants. Adjustments are recorded when there are changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to the Company's credit risk, which is based on the estimated cost of debt for market participants. This estimate represents the probability weighted analysis of expected future milestone and royalty payments based on net sales to be made to AstraZeneca. Changes to these inputs are re-evaluated each reporting period and could materially affect the valuation of the contingent consideration. During the three months ended September 30, 2018, the Company reduced its projected revenue assumptions associated with the sales of ZURAMPIC and DUZALLO and delivered to AstraZeneca a notice of termination of the Lesinurad License. The Company recognized a loss on fair value remeasurement of contingent consideration of approximately $31.0 million during the

year ended December 31, 2018. The estimated fair value of contingent consideration was insignificant as of December 31, 2018.

The following table reflects the change in the Company's Level 3 contingent consideration payable from December 31, 2016 through December 31, 2018 (in thousands):

	Contingent Consideration
Fair Value at December 31, 2016	$ 77,660
Changes in fair value	(31,310)
Payments/transfers to accrued expenses and other current liabilities	(15,092)
Fair Value at December 31, 2017	31,258
Changes in fair value	(31,045)
Payments/transfers to accrued expenses and other current liabilities	(162)
Fair value at December 31, 2018	$ 51

2.25% Convertible Senior Notes

In June 2015, the Company issued approximately $335.7 million of its 2022 Notes. The Company separately accounted for the liability and equity components of the 2022 Notes by allocating the proceeds between the liability component and equity component (Note 11). The fair value of the 2022 Notes, which differs from their carrying value, is influenced by interest rates, the price of the Company's Class A common stock and the volatility thereof, and the prices for the 2022 Notes observed in market trading, which are Level 2 inputs. The estimated fair value of the 2022 Notes as of December 31, 2018 and 2017 was approximately $315.0 million and approximately $392.8 million, respectively.

8.375% Notes Due 2026

In September 2016, the Company closed a direct private placement pursuant to which the Company issued $150.0 million in aggregate principal amount of the 2026 Notes in January 2017. The estimated fair value of the 2026 Notes was approximately $148.2 million and approximately $152.5 million as of December 31, 2018 and 2017, respectively. This valuation was calculated using a discounted cash flow estimate of expected interest and principal payments and was determined using Level 3 inputs, including significant estimates related to expected LINZESS sales and a discount rate equivalent to market participant interest rates.

Nonrecurring fair value measurements – Intangible Assets

The Company's acquired intangible assets are analyzed for impairment on a nonrecurring basis using fair value measurements with unobservable inputs (Level 3). During the three months ended September 30, 2018, the Company recorded an approximately $151.8 million impairment charge related to its acquired intangible assets. The impairment assessment performed utilized the revised projected revenue and net cash flows assumed through the termination of the Lesinurad License Agreement, resulting in an impairment of the full carrying value of the intangible assets (Note 4).

7. Available-for-Sale Securities

The Company held no available-for-sale securities at December 31, 2018. The following table summarizes the available-for-sale securities held at December 31, 2017 (in thousands):

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
December 31, 2017				
U.S. Treasury securities	$ 64,378	$ —	$ (35)	$ 64,343
U.S. government-sponsored securities	31,384	—	(47)	31,337
Total	$ 95,762	$ —	$ (82)	$ 95,680

There were 29 available-for-sale debt securities in an unrealized loss position at December 31, 2017, none of which had been in an unrealized loss position for more than twelve months. The aggregate fair value of these securities at December 31, 2017 was approximately $95.7 million. The Company reviews its investments for other-than-temporary impairment whenever the fair value of an investment is less than amortized cost and evidence indicates that an investment's carrying amount is not recoverable within a reasonable period of time. To determine whether an impairment is other-than-temporary, the Company considers whether it has the ability and intent to hold the investment until a market price recovery and considers whether evidence indicating the cost of the investment is recoverable outweighs evidence to the contrary. The Company did not intend to sell the investments and it was not more likely than not that the Company would be required to sell the investments before recovery of their amortized cost bases, which may have been maturity. The Company did not hold any securities with other-than-temporary impairment at December 31, 2018 or 2017.

There were no sales of available-for-sale securities during the years ended December 31, 2018, 2017 and 2016. Net unrealized holding gains or losses for the period that have been included in accumulated other comprehensive income were not material to the Company's consolidated results of operations.

8. Inventory

Inventory consisted of the following (in thousands):

	December 31,	
	2018	2017
Finished Goods	$ —	$ 735
	$ —	$ 735

The Company's inventory balances consist of linaclotide API and drug product and Lesinurad Products finished goods available for commercial sale. The Company evaluates inventory levels quarterly and any inventory that has a cost basis in excess of its expected net realizable value, inventory that becomes obsolete, inventory in excess of expected sales requirements, inventory that fails to meet commercial sale specifications or is otherwise impaired is written down with a corresponding charge to the statement of operations in the period that the impairment is first identified. No impairment of linaclotide API inventory was recorded during the year ended December 31, 2018.

The Company has entered into multiple commercial supply agreements for the purchase of linaclotide API. Two of the Company's linaclotide API supply agreements for supplying API to its collaboration and license partners outside of North America contain minimum purchase commitments (Note 12). The Company relied exclusively on AstraZeneca for the commercial manufacture and supply of ZURAMPIC and DUZALLO under the Lesinurad CSA, through the termination of the Lesinurad License Agreement. As part of the Company's net realizable value assessment of its inventory, the Company assesses whether it has any excess non-cancelable purchase commitments resulting from its minimum supply agreements with its suppliers.

The determination of the net realizable value of inventory and non-cancelable purchase commitments is based on demand forecasts from the Company's partners, that are received quarterly, to project future demand and the Company's internal forecast for projected demand in subsequent years. During the year ended December 31, 2015, the Company wrote down approximately $10.1 million related to excess non-cancelable purchase commitments for

linaclotide API. During the three months ended September 30, 2018, the Company assigned to Allergan certain of these linaclotide excess non-cancelable purchase commitments that the Company had previously accrued for. Accordingly, the Company relieved the previous accrual of approximately $2.5 million, which was recorded as write-down of commercial supply and inventory to net realizable value and loss on non-cancelable purchase commitments on the Company's consolidated statement of operations. As of December 31, 2018 and 2017, the accrual for excess linaclotide purchase commitments was recorded as approximately $2.5 million and approximately $3.4 million in accrued expenses and approximately $2.5 million and approximately $5.1 in other liabilities, respectively, in the Company's consolidated balance sheet.

During the Lesinurad TSA period, title for ZURAMPIC commercial supply and samples did not pass to the Company. Accordingly, the Company recorded purchases of ZURAMPIC commercial supply and samples from AstraZeneca as prepaid assets until they were sold or used. Purchases of DUZALLO commercial supply and samples were not within the scope of the Lesinurad TSA. As of October 1, 2017, in connection with the expiration of the Lesinurad TSA, the Company was no longer operating under this agreement for the warehousing and distribution of commercial supply and samples of ZURAMPIC. During the year ended December 31, 2017, the Company wrote down approximately $0.3 million of lesinurad commercial supply purchase commitments as a result of revised demand forecasts. These write-downs were recorded in write-downs of commercial supply and inventory to net realizable value and (settlement) loss on non-cancelable inventory purchase commitments in the Company's consolidated statement of operations. Further, during the year ended December 31, 2017, the Company wrote-down approximately $1.7 million of ZURAMPIC sample supply purchase commitments as a result of a reduction in near-term forecasted demand. These write-downs were recorded in selling, general and administrative expenses in the Company's consolidated statement of operations. During the year ended December 31, 2016, the Company wrote-down approximately $0.4 million in ZURAMPIC commercial supply commitments as a result of revised demand forecasts.

The Company wrote down approximately $2.5 million related to lesinurad inventory and commercial supply purchase commitments during the year ended December 31, 2018, as a result of revised demand forecasts and the notice of termination of the Lesinurad License. The adjustment was recorded as write-down of commercial supply and inventory to net realizable value and loss on non-cancelable purchase commitments. Further, during the year ended December 31, 2018, the Company wrote-down approximately $0.4 million of DUZALLO sample supply purchase commitments as a result of the notice of termination of the Lesinurad License. These write-downs were recorded in selling, general and administrative expenses in the Company's consolidated statement of operations.

As of December 31, 2018, the Company has evaluated all remaining minimum purchase commitments under its linaclotide API and lesinurad supply agreements and concluded that the commitments are realizable based on the current forecasts received from the Company's partners in these territories and the Company's internal forecasts (Note 12).

9. Property and Equipment

Property and equipment, net consisted of the following (in thousands):

	December 31,	
	2018	2017
Manufacturing equipment	$ 3,748	$ 3,748
Laboratory equipment	17,856	17,088
Computer and office equipment	3,514	2,835
Furniture and fixtures	2,478	2,318
Software	13,477	13,872
Construction in process	1,384	678
Leased vehicles	—	7,871
Leasehold improvements	40,041	38,084
	82,498	86,494
Less accumulated depreciation and amortization	(65,228)	(69,220)
	$ 17,270	$ 17,274

As of December 31, 2018 and 2017, substantially all of the Company's manufacturing equipment was located in the United Kingdom at one of the Company's contract manufacturers. All other property and equipment were located in the U.S. for the periods presented.

As of December 31, 2018 and 2017, the Company had approximately $0.2 million and $8.6 million of assets under capital leases and recorded an insignificant amount and approximately $4.6 million of accumulated amortization, respectively.

Depreciation and amortization expense of property and equipment, including amounts recorded under capital leases, was approximately $6.1 million, approximately $8.4 million, and approximately $10.3 million for the years ended December 31, 2018, 2017 and 2016, respectively. During the year ended December 31, 2017, the Company recorded an expense of approximately $0.6 million related to a loss on disposal of assets.

10. Accrued Expenses and Other Current Liabilities

Accrued expenses consisted of the following (in thousands):

	December 31,	
	2018	2017
Salaries	$ 3,627	$ 4,566
Accrued vacation	4,100	4,672
Accrued incentive compensation	16,013	13,403
Other employee benefits	2,154	1,305
Professional fees	2,770	1,261
Accrued interest	873	873
Workforce reduction charges	3,303	—
Other	12,412	12,157
	$ 45,252	$ 38,237

As of December 31, 2018, other accrued expenses of approximately $12.4 million includes approximately $2.5 million related to linaclotide excess purchase commitments, approximately $2.4 million related to a portion of the activities associated with the Company's intent to separate into two independent publicly traded companies, and approximately $1.4 million related to excess non-cancelable Lesinurad Products commercial supply and sample purchase commitments.

As of December 31, 2017, other accrued expenses of approximately $12.2 million included approximately $3.4 million related to linaclotide excess purchase commitments, approximately $1.3 million related to excess non-cancelable ZURAMPIC sample purchase commitments, and approximately $0.2 million related to ZURAMPIC finished goods inventory.

11. Notes Payable

8.375% Notes due 2026

On September 23, 2016, the Company closed a direct private placement, pursuant to which the Company issued $150.0 million in aggregate principal amount of 8.375% notes due 2026 on the Funding Date, January 5, 2017. The proceeds from the issuance of the 2026 Notes were used to redeem the outstanding principal balance of the PhaRMA Notes at par on the January 5, 2017 ("the Funding Date"), resulting in a loss on extinguishment of debt related to the write-off of the remaining PhaRMA Notes unamortized debt issuance costs of approximately $2.0 million. The Company capitalized approximately $0.5 million of debt issuance costs, which were netted against the carrying value of the 2026 Notes.

The 2026 Notes bear an annual interest rate of 8.375%, with interest payable March 15, June 15, September 15 and December 15 of each year (each an "8.375% Payment Date") which began on June 15, 2017. Principal of the 2026 Notes will be payable on the 8.375% Payment Dates beginning March 15, 2019. From March 15, 2019, the Company will make quarterly payments on the 2026 Notes equal to the greater of (i) 7.5% of net sales of linaclotide in the U.S. for the preceding quarter (the "8.375% Synthetic Royalty Amount") and (ii) accrued and unpaid interest on the 2026 Notes (the "8.375% Required Interest Amount"). Principal on the 2026 Notes will be repaid in an amount equal to the 8.375% Synthetic Royalty Amount minus the 8.375% Required Interest Amount, when this is a positive number, until the principal has been paid in full. Given the principal payments on the 2026 Notes are based on the 8.375% Synthetic Royalty Amount, which will vary from quarter to quarter, the 2026 Notes may be repaid prior to September 15, 2026,

the final legal maturity date. The Company expects to pay approximately $47.6 million of the principal within twelve months following December 31, 2018.

The 2026 Notes are secured by a security interest in a segregated bank account established to receive the required quarterly payments as well as certain limited accounts receivables, payment intangibles or other rights to payment or proceeds, in each case, up to the 8.375% Synthetic Royalty Amount or estimated equivalent thereto, as applicable. Up to the amount of the required quarterly payments under the 2026 Notes, Allergan deposits its quarterly profit (loss) sharing payments due to the Company related to net sales of linaclotide in the U.S. pursuant to the collaboration agreement for North America, if any, into the segregated bank account. If the funds deposited by Allergan into the segregated bank account are insufficient to make a required payment of interest or principal on a particular 8.375% Payment Date, the Company is obligated to deposit such shortfall out of the Company's general funds into the segregated bank account.

The 2026 Notes may be redeemed at any time prior to maturity, in whole or in part, at the option of the Company. If applicable, the Company will pay a redemption price equal to the percentage of outstanding principal balance of the 2026 Notes being redeemed specified below for the period in which the redemption occurs (plus the accrued and unpaid interest to the redemption date on the 2026 Notes being redeemed):

Payment Dates	Redemption Percentage
From and including March 15, 2018 to and including March 14, 2019	108.00 %
From and including March 15, 2019 to and including March 14, 2020	105.50 %
From and including March 15, 2020 to and including March 14, 2021	102.75 %
From and including March 15, 2021 and thereafter	100.00 %

The 2026 Notes contain certain covenants related to the Company's obligations with respect to the commercialization of linaclotide and the related collaboration agreement with Allergan for North America, as well as certain customary covenants, including covenants that limit or restrict the Company's ability to incur certain liens, merge or consolidate or make dispositions of assets. The 2026 Notes also specify a number of events of default (some of which are subject to applicable cure periods), including, among other things, covenant defaults, other non-payment defaults, and bankruptcy and insolvency defaults. Upon the occurrence of an event of default, subject to cure periods in certain circumstances, all amounts outstanding may become immediately due and payable.

The accounting for the 2026 Notes requires the Company to make certain estimates and assumptions about the future net sales of linaclotide in the U.S. Linaclotide has been marketed as LINZESS in the U.S. since December 2012 and the estimates of the magnitude and timing of linaclotide net sales are subject to significant variability and uncertainty. These estimates and assumptions are likely to change, which may result in future adjustments to the portion of the 2026 Notes that is classified as a current liability, the amortization of debt issuance costs and discounts as well as the accretion of the interest expense. Any such adjustments could be material to the Company's consolidated financial statements.

2.25% Convertible Senior Notes due 2022

In June 2015, the Company issued approximately $335.7 million aggregate principal amount of the 2022 Notes. The Company received net proceeds of approximately $324.0 million from the sale of the 2022 Notes, after deducting fees and expenses of approximately $11.7 million. The Company used approximately $21.1 million of the net proceeds from the sale of the 2022 Notes to pay the net cost of the Convertible Note Hedges (after such cost was partially offset by the proceeds to the Company from the sale of the Note Hedge Warrants), as described below.

The 2022 Notes are governed by an indenture (the "Indenture") between the Company and U.S. Bank National Association, as the trustee. The 2022 Notes are senior unsecured obligations and bear cash interest at the annual rate of 2.25%, payable on June 15 and December 15 of each year, which began on December 15, 2015. The 2022 Notes will mature on June 15, 2022, unless earlier converted or repurchased. The Company may settle conversions of the 2022 Notes through payment or delivery, as the case may be, of cash, shares of Class A common stock of the Company or a combination of cash and shares of Class A common stock, at the Company's option (subject to, and in accordance with, the settlement provisions of the Indenture). The initial conversion rate for the 2022 Notes is 60.3209 shares of Class A common stock (subject to adjustment as provided for in the Indenture) per $1,000 principal amount of the 2022 Notes, which is equal to an initial conversion price of approximately $16.58 per share and 20,249,665 shares. Holders of the 2022 Notes may convert their 2022 Notes at their option at any time prior to the close of business on the business day

immediately preceding December 15, 2021 in multiples of $1,000 principal amount, only under the following circumstances:

- during any calendar quarter commencing after the calendar quarter ending on September 30, 2015 (and only during such calendar quarter), if the last reported sale price of the Company's Class A common stock for at least 20 trading days (whether or not consecutive) during a period of 30 consecutive trading days ending on the last trading day of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price for the 2022 Notes on each applicable trading day;

- during the five business day period after any five consecutive trading day period (the "measurement period") in which the "trading price" (as defined in the Indenture) per $1,000 principal amount of the 2022 Notes for each trading day of the measurement period was less than 98% of the product of the last reported sale price of the Company's Class A common stock and the conversion rate for the 2022 Notes on each such trading day; or

- upon the occurrence of specified corporate events described in the Indenture.

On or after December 15, 2021, until the close of business on the second scheduled trading day immediately preceding June 15, 2022, holders may convert their 2022 Notes, in multiples of $1,000 principal amount, at the option of the holder regardless of the foregoing circumstances.

If a make-whole fundamental change, as described in the Indenture, occurs and a holder elects to convert its 2022 Notes in connection with such make-whole fundamental change, such holder may be entitled to an increase in the conversion rate as described in the Indenture. The Company may not redeem the 2022 Notes prior to the maturity date and no "sinking fund" is provided for by the 2022 Notes, which means that the Company is not required to periodically redeem or retire the 2022 Notes. Upon the occurrence of certain fundamental changes involving the Company, holders of the 2022 Notes may require the Company to repurchase for cash all or part of their 2022 Notes at a repurchase price equal to 100% of the principal amount of the 2022 Notes to be repurchased, plus accrued and unpaid interest.

The Indenture does not contain any financial covenants or restrict the Company's ability to repurchase the Company's securities, pay dividends or make restricted payments in the event of a transaction that substantially increases the Company's level of indebtedness. The Indenture provides for customary events of default. In the case of an event of default with respect to the 2022 Notes arising from specified events of bankruptcy or insolvency, all outstanding 2022 Notes will become due and payable immediately without further action or notice. If any other event of default with respect to the 2022 Notes under the Indenture occurs or is continuing, the trustee or holders of at least 25% in aggregate principal amount of the then outstanding 2022 Notes may declare the principal amount of the 2022 Notes to be immediately due and payable. Notwithstanding the foregoing, the Indenture provides that, upon the Company's election, and for up to 180 days, the sole remedy for an event of default relating to certain failures by the Company to comply with certain reporting covenants in the Indenture consists exclusively of the right to receive additional interest on the 2022 Notes.

In accordance with accounting guidance for debt with conversion and other options, the Company separately accounted for the liability and equity components of the 2022 Notes by allocating the proceeds between the liability component and the embedded conversion option, or equity component, due to the Company's ability to settle the 2022 Notes in cash, its Class A common stock, or a combination of cash and Class A common stock at the option of the Company. The carrying amount of the liability component was calculated by measuring the fair value of a similar liability that does not have an associated convertible feature. The allocation was performed in a manner that reflected the Company's non-convertible debt borrowing rate for similar debt. The equity component of the 2022 Notes was recognized as a debt discount and represents the difference between the gross proceeds from the issuance of the 2022 Notes and the fair value of the liability of the 2022 Notes on their respective dates of issuance. The excess of the principal amount of the liability component over its carrying amount, or debt discount, is amortized to interest expense using the effective interest method over seven years, or the life of the 2022 Notes. The equity component is not remeasured as long as it continues to meet the conditions for equity classification.

The Company's outstanding Convertible Note balances as of December 31, 2018 and 2017 consisted of the following (in thousands):

	December 31,	
	2018	2017
Liability component:		
Principal	$ 335,699	$ 335,699
Less: unamortized debt discount	(65,094)	(80,530)
Less: unamortized debt issuance costs	(5,004)	(5,976)
Net carrying amount	$ 265,601	$ 249,193
Equity component	$ 114,199	$ 114,199

In connection with the issuance of the 2022 Notes, the Company incurred approximately $11.7 million of debt issuance costs, which primarily consisted of initial purchasers' discounts and legal and other professional fees. The Company allocated these costs to the liability and equity components based on the allocation of the proceeds. The portion of these costs allocated to the equity components totaling approximately $4.0 million were recorded as a reduction to additional paid-in capital. The portion of these costs allocated to the liability components totaling approximately $7.7 million were recorded as a reduction in the carrying value of the debt on the balance sheet and are amortized to interest expense using the effective interest method over the expected life of the 2022 Notes.

The Company determined the expected life of the 2022 Notes was equal to their seven-year term. The effective interest rate on the liability components of the 2022 Notes for the period from the date of issuance through December 31, 2018 was 9.34%. The following table sets forth total interest expense recognized related to the 2022 Notes during the years ended December 31, 2018, 2017, and 2016, (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Contractual interest expense	$ 7,553	$ 7,553	$ 7,553
Amortization of debt issuance costs	971	806	661
Amortization of debt discount	15,437	14,145	12,961
Total interest expense	$ 23,961	$ 22,504	$ 21,175

Future minimum payments under the 2022 Notes as of December 31, 2018, are as follows (in thousands):

2019	$ 7,553
2020	7,553
2021	7,553
2022	339,476
Total future minimum payments under the 2022 Notes	362,135
Less: amounts representing interest	(26,436)
Less: unamortized debt discount	(65,094)
Less: unamortized debt issuance costs	(5,004)
Convertible senior notes balance	$ 265,601

Convertible Note Hedge and Warrant Transactions with Respect to 2022 Notes

To minimize the impact of potential dilution to the Company's Class A common stockholders upon conversion of the 2022 Notes, the Company entered into the Convertible Note Hedges covering 20,249,665 shares of the Company's Class A common stock in connection with the issuance of the 2022 Notes. The Convertible Note Hedges have an exercise price of approximately $16.58 per share and are exercisable when and if the 2022 Notes are converted. If upon conversion of the 2022 Notes, the price of the Company's Class A common stock is above the exercise price of the Convertible Note Hedges, the counterparties are obligated to deliver shares of the Company's Class A common stock and/or cash with an aggregate value approximately equal to the difference between the price of the Company's Class A common stock at the conversion date and the exercise price, multiplied by the number of shares of the Company's Class A common stock related to the Convertible Note Hedge being exercised.

Concurrently with entering into the Convertible Note Hedges, the Company also sold Note Hedge Warrants to the Convertible Note Hedge counterparties to acquire 20,249,665 shares of the Company's Class A common stock, subject to customary anti-dilution adjustments. The strike price of the Note Hedge Warrants is initially $21.50 per share, subject to adjustment, and such warrants are exercisable over the 150 trading day period beginning on September 15, 2022. The Note Hedge Warrants could have a dilutive effect on the Class A common stock to the extent that the market price per share of the Company's Class A common stock exceeds the applicable strike price of such warrants.

The Convertible Note Hedges and the Note Hedge Warrants are separate transactions entered into by the Company and are not part of the terms of the 2022 Notes. Holders of the 2022 Notes and the Note Hedge Warrants do not have any rights with respect to the Convertible Note Hedges. The Company paid approximately $91.9 million for the Convertible Note Hedges and recorded this amount as a long-term asset on the consolidated balance sheet. The Company received approximately $70.8 million for the Note Hedge Warrants and recorded this amount as a long-term liability, resulting in a net cost to the Company of approximately $21.1 million. The Convertible Note Hedges and Note Hedge Warrants are accounted for as derivative assets and liabilities, respectively, in accordance with ASC Topic 815, “Derivatives and Hedging” (Note 7).

12. Commitments and Contingencies

Lease Commitments

The Company rents office and laboratory space at its corporate headquarters at 301 Binney Street, Cambridge, Massachusetts (the “Facility”) under a non-cancelable operating lease, entered into in January 2007, as amended (“2007 Lease Agreement”).

In March 2017, the Company and BMR-Rogers Street LLC (the “Landlord”) entered into an additional amendment (the “2017 Amendment”) to the 2007 Lease Agreement. The 2017 Amendment extends the term of the 2007 Lease Agreement through January 31, 2025 for the approximately 223,000 square feet of the Facility that the Company currently occupies. The 2017 Amendment also provides that the Landlord resume possession of the approximately 93,000 square feet of additional space in the Facility that the Company previously subleased to a third party in 2014. The 2007 Lease Agreement, as amended by the 2017 Amendment, contains various provisions including an option to extend the term of the lease for an additional five years at a market base rental rate, a 3% annual rent escalation, and in certain cases, free rent periods. The rent expense, inclusive of the escalating rent payments and free rent periods, is recognized on a straight line basis over the lease term through January 2025. Additionally, the 2017 Amendment reduced the required letter of credit to secure the Company’s obligations under the lease agreement to approximately $6.4 million, which is recorded as restricted cash.

During 2014, the Company entered into an agreement, with the Landlord’s consent, to sublease a portion of its corporate headquarters that it did not intend to use for its operation. In connection with the sublease, as well as a rent escalation tied to the Consumer Price Index and fair market rent pursuant to the terms of the 2007 Lease Agreement, the Company had previously recorded losses related to its obligations to the Landlord associated with the sublet space, net of sublease income in accordance with ASC Topic 420, “Exit or Disposal Cost Obligations”. Pursuant to the 2017 Amendment, the Landlord resumed possession of the space that the Company previously subleased to a third party, and the Company is no longer obligated for the sublease associated with this space. The provisions of the 2007 Lease Agreement governing the space which was previously subleased were terminated and as such, the Company revised its accounting estimates associated with its rent expense and sublease income. Upon the relief of these future liabilities, the Company recorded a gain on the extinguishment of sublease loss of approximately $1.6 million during the three months ended March 31, 2017. The change in accounting estimate associated with rent expense was recognized on a prospective, straight-line basis through May 2017. Rent expenses related to the 2007 Lease Agreement and the 2017 Amendment, net of sublease income, recorded during the years ended December 31, 2018, 2017, and 2016 were approximately $18.1 million, approximately $14.7 million, and approximately $11.6 million, respectively.

During the year ended December 31, 2015, the Company entered into 12-month capital leases (the “2015 Vehicle Leases”) for certain vehicles within its vehicle fleet for its field-based sales force and medical science liaisons. The 2015 Vehicle Leases expired at varying times through December 2018. During the six months ended June 30, 2018, the Company entered into new 12-month operating leases (the “2018 Vehicle Leases”) for certain vehicles within its fleet for its field-based sales force and medical science liaisons. In connection with entering into the 2018 Vehicle Leases, all of the 2015 Vehicle Leases were terminated through December 31, 2018. The 2018 Vehicle Leases expire at

varying times beginning in April 2019, with an automatic one-month renewal provision. In accordance with the terms of the 2018 Vehicle Leases, the Company maintains a letter of credit securing its obligation under the lease agreements of $1.3 million, which is recorded as restricted cash. Rent expenses related to the 2018 Vehicle Leases were approximately $0.8 million for the year ended December 31, 2018.

The Company has also entered into capital leases for certain computer and office equipment during the year. At December 31, 2018, the weighted average interest rate on the outstanding capital lease obligations was approximately 3.4%. At December 31, 2017, the weighted average interest rate on the outstanding capital lease obligations was approximately 14.5%. At December 31, 2018, the Company had approximately $0.2 million in capital lease obligations.

At December 31, 2018, future minimum lease payments under all non-cancelable lease arrangements were as follows (in thousands):

	Operating Lease Payments
2019	$ 18,736
2020	18,312
2021	18,863
2022	19,365
2023	19,818
2024 and thereafter	22,118
Total future minimum lease payments	$ 117,212

Commercial Supply Commitments

The Company has entered into multiple supply agreements for the purchase of linaclotide finished drug product and API. Two of the Company's API supply agreements for supplying API to its collaboration partners outside of North America contain minimum purchase commitments. The amended contracts include remaining total non-cancelable commercial supply purchase obligations of approximately $20.5 million through 2023 as of December 31, 2018.

As of December 31, 2018, the Company had approximately $5.1 million related to the remaining obligations recorded as other liabilities related to linaclotide API supply (Note 8). The remaining payments under the accrued excess purchase commitments are approximately $2.5 million and approximately $2.5 million in the years 2019 and 2020, respectively. Such payments are recorded as other liabilities in the Company's consolidated balance sheet. As of December 31, 2018, the Company's unrecognized minimum purchase requirements and other firm commitments related to the supply contracts associated with the territories not covered by the partnerships with Allergan for North America were as follows (in thousands):

2019	$ 3,096
2020	3,096
2021	3,096
2022	3,096
2023	3,096
Total unrecognized minimum purchase requirements	$ 15,480

In addition, the Company and Allergan are jointly obligated to make minimum purchases of linaclotide API for the territories covered by the Company's collaboration with Allergan for North America. Currently, Allergan fulfills all such minimum purchase commitments and, as a result, they are excluded from the amounts above. As of December 31, 2018, the Company has evaluated all remaining minimum purchase commitments under its linaclotide API supply agreements and has concluded that the remaining purchase commitments are realizable based on the current forecasts received from certain of the Company's partners and the Company's internal forecasts.

Commitments Related to the Collaboration and License Agreements

Under the collaboration agreements with Allergan for North America and AstraZeneca for China, Hong Kong and Macau, respectively, the Company shares all development and commercialization costs related to linaclotide in the U.S. with Allergan and for China, Hong Kong and Macau with AstraZeneca, respectively. The actual amounts that the Company pays its partners or that partners pay to the Company will depend on numerous factors outside of the Company's control, including the success of certain clinical development efforts with respect to linaclotide, the content and timing of decisions made by the regulators, the reimbursement and competitive landscape around linaclotide and the Company's other product candidates, and other factors.

In addition, the Company has commitments to make potential future milestone payments to third parties under certain of its license and collaboration arrangements. These milestones primarily relate to the initiation and results of clinical trials, obtaining regulatory approval in various jurisdictions and the future commercial success of development programs, the outcome and timing of which are difficult to predict and subject to significant uncertainty. In addition to the milestones discussed above, the Company is obligated to pay royalties on future sales, which are contingent on generating levels of sales of future products that have not been achieved and may never be achieved.

These agreements are more fully described in Note 5, *Collaboration, License, Co-promotion and Other Commercial Agreements* , to these consolidated financial statements.

Other Funding Commitments

As of December 31, 2018, the Company has several on-going studies in various clinical trial stages. The Company's most significant clinical trial expenditures are to contract research organizations. These contracts are generally cancellable, with notice, at the Company's option and do not have any significant cancellation penalties.

Guarantees

As permitted under Delaware law, the Company indemnifies its officers and directors for certain events or occurrences while the officer or director is, or was, serving at the Company's request in such capacity. The maximum potential amount of future payments the Company could be required to make is unlimited; however, the Company has directors' and officers' insurance coverage that is intended to limit its exposure and enable it to recover a portion of any future amounts paid.

The Company enters into certain agreements with other parties in the ordinary course of business that contain indemnification provisions. These typically include agreements with directors and officers, business partners, contractors, landlords, clinical sites and customers. Under these provisions, the Company generally indemnifies and holds harmless the indemnified party for losses suffered or incurred by the indemnified party as a result of the Company's activities. These indemnification provisions generally survive termination of the underlying agreements. The maximum potential amount of future payments the Company could be required to make under these indemnification provisions is unlimited. However, to date the Company has not incurred material costs to defend lawsuits or settle claims related to these indemnification provisions. As a result, the estimated fair value of these obligations is minimal. Accordingly, the Company did not have any liabilities recorded for these obligations as of December 31, 2018 and 2017.

Litigation

From time to time, the Company is involved in various legal proceedings and claims, either asserted or unasserted, which arise in the ordinary course of business. While the outcome of these other claims cannot be predicted with certainty, management does not believe that the outcome of any of these ongoing legal matters, individually and in aggregate, will have a material adverse effect on the Company's consolidated financial statements.

The Company and Allergan have received Paragraph IV certification notice letters regarding Abbreviated New Drug Applications ("ANDAs"), submitted to the FDA by generic drug manufacturers requesting approval to engage in commercial manufacture, use, sale and offer for sale of linaclotide capsules (72 mcg, 145 mcg and 290 mcg), proposed generic versions of LINZESS. In January 2018 and April 2018, the Company and Allergan entered into settlement agreements with two such generic manufacturers, Sun Pharma Global FZE, together with its affiliates ("Sun") and Aurobindo Pharma Ltd. ("Aurobindo") and an affiliate of Aurobindo. As a result of the settlement, all Hatch-Waxman

litigation between the companies, Sun and Aurobindo regarding LINZESS patents has been dismissed. In December 2018, the Company and Allergan entered into a settlement agreement with Mylan Pharmaceuticals, Inc. ("Mylan"). Pursuant to the terms of the settlement, the Company and Allergan will grant Mylan a license to market a generic version of LINZESS 145 mcg and 290 mcg in the U.S. beginning February 5, 2030, and a generic version of LINZESS 72 mcg in the U.S. beginning August 5, 2030 (both subject to FDA approval), unless certain limited circumstances, customary for settlement agreements of this nature, occur. Further, all ongoing Hatch-Waxman litigations between the companies and Mylan regarding LINZESS patents will be dismissed.

In connection with recent settlements, the Company agreed to pay an aggregate of $4.0 million in avoidance of litigation fees and expenses.

The Company is unable to determine the outcome of its current litigation matters at this time. For additional information relating to such ANDAs and any resolution of related litigation, see Item 3, *Legal Proceedings* , elsewhere in this Annual Report on Form 10-K.

13. Stockholders' Equity

Preferred Stock

The Company's preferred stock may be issued from time to time in one or more series, with each such series to consist of such number of shares and to have such terms as adopted by the board of directors. Authority is given to the board of directors to determine and fix such voting powers, full or limited, or no voting powers, and such designations, preferences and relative participating, optional or other special rights, and qualifications, limitation or restrictions thereof, including without limitation, dividend rights, conversion rights, redemption privileges and liquidation preferences.

Common Stock

Prior to December 31, 2018, the Company had designated two series of common stock, Series A common stock ("Class A Common Stock") and Series B common stock ("Class B Common Stock"). The holders of Class A Common Stock and Class B Common Stock voted together as a single class. Class A Common Stock is entitled to one vote per share. Class B Common Stock was also entitled to one vote per share with the following exceptions: (1) after the completion of an initial public offering ("IPO") of the Company's stock, the holders of the Class B Common Stock were entitled to ten votes per share if the matter was an adoption of an agreement of merger or consolidation, an adoption of a resolution with respect to the sale, lease, or exchange of the Company's assets or an adoption of dissolution or liquidation of the Company, and (2) Class B common stockholders were entitled to ten votes per share on any matter if any individual, entity, or group sought to obtain or had obtained beneficial ownership of 30% or more of the Company's outstanding shares of common stock. Class B Common Stock could be sold at any time and irrevocably converted to Class A Common Stock, on a one-for-one basis, upon sale or transfer. The Class B Common Stock was also entitled to a separate class vote for the issuance of additional shares of Class B Common Stock (except pursuant to dividends, splits or convertible securities), or any amendment, alteration or repeal of any provision of the Company's charter.

On December 31, 2018, all Class B Common Stock automatically converted into Class A Common Stock. The Company had reserved such number of shares of Class A Common Stock as there were outstanding shares of Class B Common Stock solely for the purpose of effecting the conversion of the Class B Common Stock. Upon conversion, 13,972,688 shares of Class B Common Stock were converted to Class A Common Stock. There are no outstanding shares of Class B Common Stock remaining after the conversion as of December 31, 2018.

The Company has reserved, out of its authorized but unissued shares of Class A Common Stock, sufficient shares to effect the conversion of the 2022 Notes and the Note Hedge Warrants, pursuant to the terms thereof (Note 11).

The Company's shareholders are entitled to dividends if and when declared by the board of directors.

14. Stock Benefit Plans

The following table summarizes the expense recognized for share-based compensation arrangements in the consolidated statements of operations (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Employee stock options	$ 22,410	$ 21,261	$ 21,412
Restricted stock units	18,680	8,631	4,023
Restricted stock awards	2,329	2,441	2,325
Non-employee stock options	—	301	529
Employee stock purchase plan	1,097	1,172	910
Stock award	17	14	20
	$ 44,533	$ 33,820	$ 29,219

Share-based compensation is reflected in the consolidated statements of operations as follows for the years ended December 31, 2018, 2017 and 2016 (in thousands):

	Years Ended December 31,		
	2018	2017	2016
Research and development	$ 14,849	$ 12,768	$ 11,344
Selling, general and administrative	27,442	21,052	17,875
Restructuring expenses	2,242	—	—
	$ 44,533	$ 33,820	$ 29,219

During the three months ended March 31, 2018, the Company reduced its field-based workforce by approximately 60 employees, primarily consisting of field-based sales representatives that promoted DUZALLO or ZURAMPIC in the first position, resulting in a modification to certain share-based payment awards. As a result of the modification, the Company recorded stock-based compensation expense of approximately $0.2 million to restructuring expenses during the year ended December 31, 2018.

During the three months ended June 30, 2018, the Company initiated a reduction in headquarter-based workforce by approximately 40 employees associated with the Company's intent to separate. Certain share-based payment awards were modified in connection with the reduction in workforce. As a result of the modifications, the Company recorded share-based compensation expense of approximately $1.5 million to restructuring expenses during the year ended December 31, 2018.

During the three months ended September 30, 2018, the Company reduced its workforce by approximately 100 employees, primarily consisting of field-based sales representatives as a result of the termination of the Lesinurad License. Certain share-based payment awards were modified in connection with the reduction in workforce. As a result of the modifications, the Company recorded share-based compensation expense of approximately $0.6 million to restructuring expenses during the year ended December 31, 2018.

Stock Benefit Plans

The Company has two share-based compensation plans pursuant to which awards are currently being made: the Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan ("2010 Equity Plan") and the Amended and Restated 2010 Employee Stock Purchase Plan ("2010 Purchase Plan"). The Company also has one share-based compensation plans under which there are outstanding awards, but from which no further awards will be made: the Amended and Restated 2005 Stock Incentive Plan ("2005 Equity Plan"). At December 31, 2018, there were 20,896,991 shares available for future grant under all such plans.

2010 Equity Plan

During 2010, the Company's stockholders approved the 2010 Equity Plan under which stock options, restricted stock awards, RSUs, and other stock-based awards may be granted to employees, officers, directors, or consultants of the Company. There were 6,000,000 shares of common stock initially reserved for issuance under the 2010 Equity Plan. The number of shares available for future grant may be increased on the first day of each fiscal year by an amount equal to the lesser of: (i) 6,600,000; (ii) 4% of the number of outstanding shares of common stock on the first day of each fiscal year; and (iii) an amount determined by the board of directors. Awards that are returned to the Company's other equity plans as a result of their expiration, cancellation, termination or repurchase are automatically made available for issuance under the 2010 Equity Plan. At December 31, 2018, there were 16,712,852 shares available for future grant under the 2010 Equity Plan.

2010 Purchase Plan

During 2010, the Company's stockholders approved the 2010 Purchase Plan, which gives eligible employees the right to purchase shares of common stock at the lower of 85% of the fair market value on the first or last day of an offering period. Each offering period is six months. There were 400,000 shares of common stock initially reserved for issuance pursuant to the 2010 Purchase Plan. The number of shares available for future grant under the 2010 Purchase Plan may be increased on the first day of each fiscal year by an amount equal to the lesser of: (i) 1,000,000 shares, (ii) 1% of the Class A shares of common stock outstanding on the last day of the immediately preceding fiscal year, or (iii) such lesser number of shares as is determined by the board of directors. At December 31, 2018, there were 4,184,139 shares available for future grant under the 2010 Purchase Plan.

2005 Equity Plan

The 2005 Equity Plan provided for the granting of stock options, restricted stock awards, RSUs, and other share-based awards to employees, officers, directors, consultants, or advisors of the Company. At December 31, 2018, there were no shares available for future grant under the 2005 Equity Plan.

Restricted Stock Awards

In 2018, the Company granted an aggregate of 129,784 shares of Class A Common Stock to independent members of the board of directors under restricted stock agreements in accordance with the terms of the 2010 Equity Plan and the Company's director compensation plan, effective in January 2014. These shares of restricted stock vest ratably over the period of service from the Company's 2018 annual meeting of stockholders through the Company's 2019 annual meeting of stockholders, provided the individual continues to serve on the Company's board of directors through each vest date.

In 2017, the Company granted an aggregate of 134,793 shares of Class A Common Stock to independent members of the board of directors under restricted stock agreements in accordance with the terms of the 2010 Equity Plan and the Company's director compensation plan, effective in January 2014. These shares of restricted stock vest ratably over the period of service from the Company's 2017 annual meeting of stockholders through the Company's 2018 annual meeting of stockholders, provided the individual continues to serve on the Company's board of directors through each vest date.

A summary of the unvested shares of restricted stock as of December 31, 2018 is presented below:

	Number of Shares	Weighted-Average Grant Date Fair Value
Unvested as of December 31, 2017	62,496	$ 17.71
Granted	129,784	$ 18.58
Vested	(127,384)	$ 18.15
Forfeited	—	$ —
Unvested as of December 31, 2018	64,896	$ 18.58

Restricted Stock Units

In 2015, the Company began utilizing RSUs, in addition to stock options as part of the equity compensation it provides to its employees, each RSU representing the right to receive one share of the Company's Class A Common Stock pursuant to the terms of the applicable award agreement and granted pursuant to the terms of the Company's 2010 Equity Plan. The RSUs generally vest 25% per year on the approximate anniversary of the date of grant until fully vested, provided the employee remains continuously employed with the Company through each vesting date. Shares of the Company's Class A Common Stock are delivered to the employee upon vesting, subject to payment of applicable withholding taxes. The fair value of all RSUs is based on the market value of the Company's Class A Common Stock on the date of grant. Compensation expense, including the effect of estimated forfeitures, is recognized over the applicable service period.

A summary of RSU activity for the year ended December 31, 2018 is as follows:

	Number of Shares	Weighted-Average Grant Date Fair Value
Unvested as of December 31, 2017	2,277,165	$ 15.08
Granted	2,048,806	$ 15.63
Vested	(751,437)	$ 14.71
Forfeited	(516,726)	$ 15.14
Unvested as of December 31, 2018	3,057,808	$ 15.53

Stock Options

Stock options granted under the Company's equity plans generally have a ten-year term and vest over a period of four years, provided the individual continues to serve at the Company through the vesting dates. Options granted under all equity plans are exercisable at a price per share not less than the fair market value of the underlying common stock on the date of grant. The estimated fair value of options, including the effect of estimated forfeitures, is recognized over the requisite service period, which is typically the vesting period of each option.

The weighted average assumptions used to estimate the fair value of the stock options using the Black-Scholes option-pricing model were as follows for the years ended December 31, 2018, 2017 and 2016:

	Year Ended December 31,		
	2018	2017	2016
Expected volatility	43.7 %	45.8 %	45.9 %
Expected term (in years)	6.03	6.00	6.06
Risk-free interest rate	2.7 %	2.0 %	1.5 %
Expected dividend yield	— %	— %	— %

Expected volatility is based on the historic volatility of the Company's Class A common stock. The Company estimates the expected term using historical data. The risk-free interest rate used for each grant is based on a zero-coupon U.S. Treasury instrument with a remaining term similar to the expected term of the share-based award. The

Company has not paid and does not anticipate paying cash dividends on its shares of common stock in the foreseeable future; therefore, the expected dividend yield is assumed to be zero.

The weighted-average grant date fair value per share of options granted during the years ended December 31, 2018, 2017 and 2016 was $6.81, $7.62, and $5.08, respectively.

The Company's Class A Common Stock is issuable upon exercise of all options granted after the closing of the Company's IPO under the Company's equity plans. At December 31, 2018, options exercisable into 20,457,537 shares of Class A Common Stock were outstanding.

Subject to approval by the board of directors, option grantees under the 2005 Equity Plan may have the right to exercise an option prior to vesting. The exercise of these shares is not substantive and as a result, the cash paid for the exercise prices is considered a deposit or prepayment of the exercise price and is recorded as a liability. For each of the years ended December 31, 2018 and 2017, there were no option exercises prior to vesting, and as such, no liabilities were recorded.

The Company, from time to time, issues certain time-accelerated stock options to certain employees. The vesting of these options accelerates upon the achievement of certain performance-based milestones. If these criteria are not met, such options will vest between six and ten years after the date of grant. During the year ended December 31, 2018, there were no shares that vested as a result of milestone or service period achievements. At both December 31, 2018 and 2017, there were no shares issuable under unvested time-accelerated options, respectively. When achievement of the milestone is not deemed probable, the Company recognizes compensation expense associated with time-accelerated stock options initially over the vesting period of the respective stock option. When deemed probable of achievement, the Company expenses the remaining unrecognized compensation over the implicit service period. The Company recorded no share-based compensation expense related to these time-accelerated options during the year ended December 31, 2018, and recorded an insignificant amount in share-based compensation related to these time-accelerated options during each of the years ended December 31, 2017 and 2016.

The Company also grants to certain employees performance-based options to purchase shares of common stock. These options are subject to performance-based milestone vesting. During the years ended December 31, 2018 and 2017, there were no shares and 351,500 shares, respectively, that vested as a result of performance milestone achievements. The Company recorded no share-based compensation expense related to these performance-based options during each of the years ended December 31, 2018 and 2017, respectively. The Company recorded share-based compensation related to these performance-based options of approximately $1.4 million during the year ended December 31, 2016.

The following table summarizes stock option activity under the Company's share-based compensation plans, including performance-based options:

	Shares of Common Stock Attributable to Options	Weighted-Average Exercise Price	Weighted-Average Contractual Life	Aggregate Intrinsic Value
			(in years)	(in thousands)
Outstanding at December 31, 2017	21,086,298	$ 12.90	6.09	$ 51,476
Granted	3,247,071	$ 14.92		
Exercised	(2,782,061)	$ 10.30		
Cancelled	(1,093,771)	$ 14.86		
Outstanding at December 31, 2018	20,457,537	$ 13.47	5.80	$ 4,147
Vested or expected to vest at December 31, 2018	19,571,139	$ 13.41	5.68	$ 4,031
Exercisable at December 31, 2018 [1]	15,051,200	$ 13.17	4.99	$ 2,872

(1) All stock options granted under the 2005 Equity Plan contain provisions allowing for the early exercise of such options into restricted stock. The exercisable shares disclosed above represent those that were vested as of December 31, 2018.

The total intrinsic value of options exercised during the years ended December 31, 2018, 2017 and 2016 was approximately $20.1 million, approximately $16.0 million, and approximately $23.9 million, respectively. The intrinsic

value was calculated as the difference between the fair value of the Company's common stock and the exercise price of the option issued.

The following table sets forth the Company's unrecognized share-based compensation expense, net of estimated forfeitures, as of December 31, 2018, by type of award and the weighted-average period over which that expense is expected to be recognized:

	Unrecognized Expense, Net of Estimated Forfeitures (in thousands)	Weighted-Average Remaining Recognition Period (in years)
Type of award:		
Stock options with time-based vesting	$ 27,766	2.36
Restricted stock awards	998	0.41
Restricted stock units	25,872	2.22
Performance-based options [1]	1,116	—

(1) The weighted-average remaining recognition period cannot be determined for performance-based or time-accelerated options due to the nature of such awards, as detailed above.

The total unrecognized share-based compensation cost will be adjusted for future changes in estimated forfeitures.

15. Income Taxes

In general, the Company has not recorded a provision for federal or state income taxes as it has had cumulative net operating losses since inception.

On December 22, 2017, the Tax Cuts and Jobs Act was enacted. This law substantially amended the Internal Revenue Code, including reducing the U.S. corporate tax rates. Upon enactment, the Company's deferred tax asset and related valuation allowance decreased by approximately $153.9 million. As the deferred tax asset is offset in full by valuation allowance, this enacted legislation had no impact on the Company's financial position or results of operations. The Company completed its accounting for the tax effects of the Tax Cuts and Job Act as of December 31, 2018 and did not record any material adjustments to its original estimate.

A reconciliation of income taxes computed using the U.S. federal statutory rate to that reflected in operations follows (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Income tax benefit using U.S. federal statutory rate	$ (59,297)	$ (39,759)	$ (27,780)
Effect of U.S. tax reform	—	153,894	—
Permanent differences	1,221	1,380	1,140
State income taxes, net of federal benefit	(17,121)	(6,117)	(4,606)
Non-deductible share-based compensation	(494)	9	3,528
Excess tax benefits	(1,223)	(2,626)	(5,453)
Fair market valuation of Note Hedge Warrants and Convertible Note Hedges	2,367	1,289	(3,160)
Tax credits	(7,863)	(12,290)	(3,014)
Expiring net operating losses and tax credits	250	276	39
Effect of change in state tax rate on deferred tax assets and deferred tax liabilities	1,476	(232)	(3,564)
Change in the valuation allowance	80,684	(95,824)	42,975
Other	—	—	(105)
	$ —	$ —	$ —

Components of the Company's deferred tax assets and liabilities are as follows (in thousands):

	Year Ended December 31,	
	2018	2017
Deferred tax assets:		
Net operating loss carryforwards	$ 259,450	$ 254,839
Tax credit carryforwards	60,115	50,732
Capitalized research and development	12,113	14,754
Contingent consideration	14	8,540
Share-based compensation	23,242	18,321
Basis difference on North America collaboration agreement	36,423	22,683
Accruals and reserves	10,867	10,595
Basis difference on 2022 Notes	7,220	3,110
Interest expense	5,104	—
Intangibles	25,928	—
Other	18,867	10,375
Total deferred tax assets	459,343	393,949
Deferred tax liabilities:		
Intangibles	—	(15,252)
Total deferred tax liabilities	—	(15,252)
Net deferred tax asset	459,343	378,697
Valuation allowance	(459,343)	(378,697)
Net deferred tax asset	$ —	$ —

Management of the Company has evaluated the positive and negative evidence bearing upon the realizability of its deferred tax assets. Management has considered the Company's history of operating losses and concluded, in accordance with the applicable accounting standards, that it is more likely than not that the Company will not realize the benefit of its deferred tax assets. Accordingly, the deferred tax assets have been fully reserved at December 31, 2018 and 2017. Management reevaluates the positive and negative evidence on a quarterly basis.

The valuation allowance increased approximately $80.7 million during the year ended December 31, 2018 primarily due to the 2018 net operating loss and increase in tax credit carryforwards; the establishment of a deferred tax asset for temporarily disallowed interest expense; an increase in the basis difference on the collaboration agreement for North America with Allergan; and an increase in intangible deferred tax assets as a result of the impairment of the lesinurad franchise, partially offset by adjustments to the contingent consideration obligation.

The valuation allowance decreased approximately $95.8 million during the year ended December 31, 2017 primarily due to a decrease in net operating losses as a result of U.S. tax reform tax rate reduction, a decrease in contingent consideration, and a decrease in capitalized research & development, partially offset by the 2017 net operating loss and increase in tax credit carryforwards.

Subject to the limitations described below, at December 31, 2018 and 2017, the Company has federal net operating loss carryforwards of approximately $1.2 billion and approximately $1.1 billion, respectively, to offset future federal taxable income, which expire beginning in 2019 continuing through 2037. The 2018 net operating loss of $76 million has an indefinite life. As of December 31, 2018 and 2017, the Company had state net operating loss carryforwards of approximately $ 877.1 million and approximately $807.7 million, respectively, to offset future state taxable income, which will begin to expire in 2027 and will continue to expire through 2038. The Company also had tax credit carryforwards of approximately $ 63.3 million and approximately $53.6 million as of December 31, 2018 and 2017, respectively, to offset future federal and state income taxes, which expire at various times through 2038.

Utilization of net operating loss carryforwards and research and development credit carryforwards may be subject to a substantial annual limitation due to ownership change limitations that could occur in the future in accordance with Section 382 of the Internal Revenue Code of 1986 ("IRC Section 382") and with Section 383 of the Internal Revenue Code of 1986, as well as similar state provisions. These ownership changes may limit the amount of net operating loss carryforwards and research and development credit carryforwards that can be utilized annually to offset future taxable income and taxes, respectively. In general, an ownership change, as defined by IRC Section 382, results from transactions increasing the ownership of certain stockholders or public groups in the stock of a corporation by more

than 50 percentage points over a three-year period. The Company has completed several financings since its inception which may result in a change in control as defined by IRC Section 382, or could result in a change in control in the future.

The following table summarizes the changes in the Company's unrecognized income tax benefits for the years ended December 31, 2018, 2017 and 2016 (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Balance at the beginning of the period	$ 24,078	$ 26,393	$ 17,614
Increases based on tax positions related to the current period	38,551	24,078	26,393
Decreases for tax positions in prior periods	(24,078)	(26,393)	(17,614)
Balance at the end of the period	$ 38,551	$ 24,078	$ 26,393

The Company had gross unrecognized tax benefits of approximately $ 38.6 million, approximately $24.1 million, and approximately $26.4 million as of December 31, 2018, 2017 and 2016 , respectively . Of the approximately $38.6 million of total unrecognized tax benefits at December 31, 2018, none of the unrecognized tax positions would, if recognized, affect the Company's effective tax rate, as this item only impacts the Company's deferred tax accounting.

The Company will recognize interest and penalties, if any, related to uncertain tax positions in income tax expense. As of December 31, 2018, no interest or penalties have been accrued.

The statute of limitations for assessment by the Internal Revenue Service ("IRS") and state tax authorities is open for tax years ended December 31, 2018, 2017, and 2016, although carryforward attributes that were generated prior to tax year 2016 may still be adjusted upon examination by the IRS or state tax authorities if they either have been, or will be, used in a future period. There are currently no federal or state income tax audits in progress.

16. Defined Contribution Plan

The Ironwood Pharmaceuticals, Inc. 401(k) Savings Plan is a defined contribution plan in the form of a qualified 401(k) plan in which substantially all employees are eligible to participate upon employment. Subject to certain IRS limits, eligible employees may elect to contribute from 1% to 100% of their compensation. Company contributions to the plan are at the sole discretion of the Company's board of directors. Currently, the Company provides a matching contribution of 75% of the employee's contributions, up to $6,000 annually. During the years ended December 31, 2018, 2017 and 2016, the Company recorded approximately $3.7 million, approximately $3.9 million, and approximately $3.2 million of expense related to its 401(k) company match, respectively.

17. Related Party Transactions

In September 2009, Allergan became a related party when the Company sold to Allergan 2,083,333 shares of the Company's convertible preferred stock. Amounts due to and due from Allergan are reflected as related party accounts payable and related party accounts receivable, respectively. These balances are reported net of any balances due to or from the related party. As of December 31, 2018 and 2017, the Company had approximately $60.0 million and approximately $79.0 million, respectively, in related party accounts receivable, net of related party accounts payable, associated with Allergan.

The Company has and currently obtains health insurance services for its employees from an insurance provider whose President and Chief Executive Officer became a member of the Company's Board of Directors in April 2016. The Company paid approximately $11.9 million, approximately $12.1 million, and approximately $8.5 million in insurance premiums to this insurance provider during the years ended December 31, 2018, 2017, and 2016, respectively. At both December 31, 2018 and 2017, the Company had no accounts payable due to this related party.

18. Workforce Reduction

On January 30, 2018, the Company commenced an initiative to evaluate the optimal mix of investments for the lesinurad franchise. As part of this effort, the Company reduced its field-based workforce by approximately 60 employees, primarily consisting of field-based sales representatives that promoted DUZALLO or ZURAMPIC in the first position.

During the three months ended March 31, 2018, the Company substantially completed the implementation of this reduction in field-based workforce and, in accordance with ASC 420, *Exit or Disposal Activities* , recorded approximately $2.4 million of costs including employee severance, benefits and related costs. These costs are reflected in the consolidated statement of operations as approximately $2.4 million in restructuring expenses.

On June 27, 2018, the Company determined the initial organizational designs of the two new businesses, including employees' roles and responsibilities, in connection with the Company's intent to separate its sGC business from its commercial and GI business. As part of this process, the Company has initiated a reduction in its headquarter-based workforce by approximately 40 employees and substantially completed the reduction in its workforce during the year ending December 31, 2018. During the year ended December 31, 2018, the Company recorded approximately $5.2 million of costs, including employee severance, benefits and related costs, in connection with the reduction in workforce associated with the Company's intent to separate in accordance with ASC 420, *Exit and Disposal Activities* . These costs are reflected in the consolidated statement of operations as restructuring expenses.

On August 16, 2018, the Company initiated a reduction in its workforce by approximately 100 employees, primarily consisting of field-based sales representatives in connection with the termination of the Lesinurad License and substantially completed the reduction in its workforce and record associated costs during the year ended December 31, 2018. During the year ended December 31, 2018, the Company recorded approximately $8.3 million of costs, including approximately $5.4 million of severance, benefits and related costs and approximately $2.9 million of contract-related costs, including the write-down of certain prepaid assets and deposits, in accordance with ASC 420, *Exit and Disposal Activities* . These costs are reflected in the consolidated statement of operations as restructuring expenses.

The following table summarizes the accrued liabilities activity recorded in connection with the reduction in workforce for the year ended December 31, 2018 (in thousands):

	Charges	Amount Paid	Adjustments	Amounts Accrued at December 31, 2018
Employee severance, benefits and related costs				
January 2018 Reduction	$ 2,228	$ (2,215)	$ (13)	$ —
June 2018 Reduction	4,009	(2,776)	(119)	1,114
August 2018 Reduction	5,383	(3,522)	(105)	1,756
Total	$ 11,620	$ (8,513)	$ (237)	$ 2,870
Contract related costs				
August 2018 Reduction	$ 1,265	$ (614)	$ (218)	$ 433
Total	$ 1,265	$ (614)	$ (218)	$ 433

During the year ended December 31, 2018, the Company recorded approximately $15.9 million in restructuring expenses.

19. Selected Quarterly Financial Data (Unaudited)

The following table contains quarterly financial information for the years ended December 31, 2018 and 2017. The Company believes that the following information reflects all normal recurring adjustments necessary for a fair

presentation of the information for the periods presented. The operating results for any quarter are not necessarily indicative of results for any future period.

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total Year
	(in thousands, except per share data)				
2018					
Total revenues [1]	$ 69,155	$ 81,106	$ 65,686	$ 130,692	$ 346,639
Total cost and expenses [2]	105,023	121,026	234,785	124,697	585,531
Other expense, net [3]	(7,276)	(9,460)	(5,252)	(21,488)	(43,476)
Net loss	(43,144)	(49,380)	(174,351)	(15,493)	(282,368)
Net loss per share--basic and diluted	$ (0.29)	$ (0.32)	$ (1.14)	$ (0.10)	$ (1.85)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total Year
	(in thousands, except per share data)				
2017					
Total revenues [4]	$ 52,166	$ 65,077	$ 86,825	$ 94,208	$ 298,276
Total cost and expenses [5]	91,871	106,088	106,259	71,443	375,661
Other expense, net [6]	(12,796)	(3,213)	(12,863)	(10,680)	(39,552)
Net (loss) income	(52,501)	(44,224)	(32,297)	12,085	(116,937)
Net (loss) income per share--basic and diluted	$ (0.36)	$ (0.30)	$ (0.22)	$ 0.08	$ (0.78)

(1) Total revenues includes approximately $70.4 million of revenue from sales of linaclotide API to our linaclotide partners, primarily driven by the commercialization of linaclotide in Japan for the year ended December 31, 2018.

(2) Total costs and expenses includes approximately $15.9 million in restructuring expenses for the year ended December 31, 2018, as well as approximately $151.8 million related to the impairment of intangible assets and approximately $31.0 million related to a gain on remeasurement of contingent consideration incurred during the third quarter of 2018 in connection with the exit of the Lesinurad License.

(3) Other expense, net includes approximately $8.7 million loss on fair value remeasurement of derivatives for the year ended December 31, 2018.

(4) Total revenues includes approximately $29.7 million of revenue from sales of linaclotide API to our linaclotide partners, primarily driven by the commercialization of linaclotide in Japan for the year ended December 31, 2017.

(5) Total costs and expenses includes approximately $39.3 million reduction in the fourth quarter of 2017 related to a gain on remeasurement of contingent consideration pursuant to the Company's exclusive license to develop, manufacture, and commercialize products containing lesinurad as an active ingredient, including ZURAMPIC and DUZALLO, in the U.S. The contingent consideration obligation is revalued at each reporting period and changes in the fair value, other than changes due to payments, are recognized as a gain/(loss) on fair value remeasurement of contingent consideration in the Company's statement of operations. Adjustments are recorded when there are changes in significant assumptions, including net sales projections, probability weighted net cash outflow projections, the discount rate, passage of time, and the yield curve equivalent to the Company's credit risk, which is based on the estimated cost of debt for market participants. During the year ended December 31, 2017, the Company decreased its Lesinurad Products revenue projection. Accordingly, the expected estimated future royalty and milestone payments to AstraZeneca decreased, resulting in an approximately $31.3 million decrease to the contingent consideration liability.

(6) Other (expense) income, net includes an approximately $2.0 million loss on extinguishment of debt in the first quarter of 2017 related to the write-off of the remaining PhaRMA Notes unamortized debt issuance costs.

20. Subsequent Events

On January 4, 2019, the Company announced certain management changes in connection with, and, in certain instances, contingent upon successful completion of, the planned separation. On January 3, 2019, the Company entered into an agreement with Mark Mallon to become an Executive Senior Advisor to the Company. Mr. Mallon will be a full-time employee of the Company, initially responsible for performing such executive level duties and responsibilities as the Chair of the Governance and Nominating Committee of the Company's board of directors may assign. In addition, the Company announced on January 4, 2019 that, upon successful completion of the separation, Peter M. Hecht, the Company's current Chief Executive Officer, is expected to resign from that position, as well as his position as a member of the board of directors, and become, subject to approval by the board of directors of Cyclerion, Chief

Executive Officer of Cyclerion and a member of its board of directors. The Ironwood board of directors has agreed, if and when the separation is completed, to elevate Mr. Mallon to the position of Chief Executive Officer of the Company, subject to his satisfactory performance of his role as Executive Senior Advisor. If Mr. Mallon becomes Chief Executive Officer of the Company, he will serve as a member of the Ironwood board of directors, subject to the Ironwood board of directors' approval.

On February 7, 2019, following further analysis of Company's strategy and core business needs, and in an effort to further strengthen the operational efficiency of its organization, the Company commenced a reduction in its workforce by 35 employees, primarily based in the home office. The Company's field-based sales force and employees expected to go to Cyclerion are excluded from the workforce reduction. The Company expects to substantially complete the reduction in its workforce during the first quarter of 2019.

The Company estimates that, in connection with this reduction in its workforce, it will incur substantially all aggregate charges in the first quarter of 2019 of approximately $3.0 million to approximately $4.0 million for one-time employee severance and benefit costs. Of these charges, approximately 85% are expected to result in cash expenditures.

Exhibit Index

Number	Description	Incorporated by reference herein	
		Form	Date
3.1	Eleventh Amended and Restated Certificate of Incorporation	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2010
3.2	Fifth Amended and Restated Bylaws	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2010
3.3	Certificate of Retirement	Registration Statement on Form 8-A/A (File No. 001-34620)	January 3, 2019
4.1	Specimen Class A common stock certificate	Registration Statement on Form S-1, as amended (File No. 333-163275)	January 20, 2010
4.2	Indenture, dated as of June 15, 2015, by and between Ironwood Pharmaceuticals, Inc. and U. S. Bank National Association (including the form of the 2.25% Convertible Senior Note due 2022)	Current Report on Form 8-K (File No. 001-34620)	June 15, 2015
4.3	Indenture, dated as of September 23, 2016, by and between Ironwood Pharmaceuticals, Inc. and U.S. Bank National Association (including the form of the 8.375% Notes due 2026)	Current Report on Form 8-K (File No. 001-34620)	September 26, 2016
10.1#	Amended and Restated 2002 Stock Incentive Plan and form agreements thereunder	Registration Statement on Form S-1, as amended (File No. 333-163275)	December 23, 2009
10.2#	Amended and Restated 2005 Stock Incentive Plan and form agreements thereunder	Registration Statement on Form S-1, as amended (File No. 333-163275)	January 29, 2010
10.3#	Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Registration Statement on Form S-8, as amended (File No. 333-184396)	October 12, 2012
10.3.1#	Form of Stock Option Agreement under the Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Quarterly Report on Form 10-Q (File No. 001-34620)	November 6, 2018
10.3.2#	Form of Non-employee Director Restricted Stock Agreement under the Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.3.3#	Form of Restricted Stock Unit Agreement under the Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan	Quarterly Report on Form 10-Q (File No. 001-34620)	November 6, 2018
10.4#	Amended and Restated 2010 Employee Stock Purchase Plan	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.5#	Change of Control Severance Benefit Plan, as amended and restated	Quarterly Report on Form 10-Q (File No. 001-34620)	April 29, 2014

Number	Description	Incorporated by reference herein	
		Form	Date
10.6#*	Form of Executive Severance Agreement		
10.7#	Director Compensation Plan effective January 1, 2014	Annual Report on Form 10-K (File No. 001-34620)	February 7, 2014
10.8#	Form of Indemnification Agreement with Directors and Officers	Registration Statement on Form S-1, as amended (File No. 333-163275)	December 23, 2009
10.9#	Offer Letter, dated January 3, 2019, between Ironwood Pharmaceuticals, Inc. and Mark Mallon	Current Report on Form 8-K (File No. 001-34620)	January 4, 2019
10.10+	Collaboration Agreement, dated as of September 12, 2007, as amended on November 3, 2009, by and between Forest Laboratories, Inc. and Ironwood Pharmaceuticals, Inc.	Registration Statement on Form S-1, as amended (File No. 333-163275)	February 2, 2010
10.10.1	Amendment No. 2 to the Collaboration Agreement, dated as of January 8, 2013, by and between Forest Laboratories, Inc. and Ironwood Pharmaceuticals, Inc .	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.11+	Commercial Agreement, dated as of January 31, 2017, by and among Allergan USA, Inc., Forest Laboratories, LLC and Ironwood Pharmaceuticals, Inc.	Quarterly Report on Form 10-Q (File No. 001-34620)	May 8, 2017
10.12+	License Agreement, dated as of April 30, 2009, by and between Allergan Pharmaceuticals International Ltd. (formerly with Almirall, S.A.) and Ironwood Pharmaceuticals, Inc.	Registration Statement on Form S-1, as amended (File No. 333-163275)	February 2, 2010
10.12.1+	Amendment No. 1 to License Agreement, dated as of June 11, 2013, by and between Allergan Pharmaceuticals International Ltd. (formerly with Almirall, S.A.) and Ironwood Pharmaceuticals, Inc .	Quarterly Report on Form 10-Q (File No. 001-34620)	August 8, 2013
10.12.2+	Amendment to the License Agreement, dated as of October 26, 2015, by and between Allergan Pharmaceuticals International Ltd. and Ironwood Pharmaceuticals, Inc.	Annual Report on Form 10-K (File No. 001-34620)	February 19, 2016
10.12.3+	Amendment to the License Agreement dated as of January 31, 2017, by and between Allergan Pharmaceuticals International Ltd., and Ironwood Pharmaceuticals, Inc .	Quarterly Report on Form 10-Q (File No. 001-34620)	May 8, 2017

Number	Description	Incorporated by reference herein	
		Form	Date
10.13+	Novation Agreement, dated as of October 26, 2015, by and among Almirall, S.A., Allergan Pharmaceuticals International Ltd. and Ironwood Pharmaceuticals, Inc .	Annual Report on Form 10-K (File No. 001-34620)	February 19, 2016
10.14+	License Agreement, dated as of November 10, 2009, by and among Astellas Pharma Inc. and Ironwood Pharmaceuticals, Inc .	Registration Statement on Form S-1, as amended (File No. 333-163275)	February 2, 2010
10.15+	Collaboration Agreement, dated as of October 23, 2012, by and between AstraZeneca AB and Ironwood Pharmaceuticals, Inc .	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.16+	License Agreement, dated as of April 26, 2016, by and between Ardea Biosciences, Inc. and Ironwood Pharmaceuticals, Inc .	Quarterly Report on Form 10-Q (File No. 001-34620)	August 8, 2016
10.17+	Commercial Supply Agreement, dated as of June 23, 2010, by and among PolyPeptide Laboratories, Inc. and Polypeptide Laboratories (SWEDEN) AB, Forest Laboratories, Inc. and Ironwood Pharmaceuticals, Inc .	Quarterly Report on Form 10-Q (File No. 001-34620)	August 10, 2010
10.18+	Commercial Supply Agreement, dated as of March 28, 2011, by and among Corden Pharma Colorado, Inc. (f/k/a Roche Colorado Corporation), Ironwood Pharmaceuticals, Inc. and Forest Laboratories, Inc .	Quarterly Report on Form 10-Q (File No. 001-34620)	May 13, 2011
10.18.1+	Amendment No. 3 to Commercial Supply Agreement, dated as of November 26, 2013, by and between Corden Pharma Colorado, Inc. (f/k/a Roche Colorado Corporation), Ironwood Pharmaceuticals, Inc. and Forest Laboratories, Inc.	Annual Report on Form 10-K (File No. 001-34620)	February 7, 2014
10.19+	Commercial Supply Agreement, dated as of April 26, 2016, by and between AstraZeneca Pharmaceuticals LP and Ironwood Pharmaceuticals, Inc .	Quarterly Report on Form 10-Q (File No. 001-34620)	August 8, 2016
10.20	Lease for facilities at 301 Binney St., Cambridge, MA, dated as of January 12, 2007, as amended on April 9, 2009, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Registration Statement on Form S-1, as amended (File No. 333-163275)	December 23, 2009

Number	Description	Incorporated by reference herein	
		Form	Date
10.20.1	Second Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of February 9, 2010, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2010
10.20.2	Third Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of July 1, 2010, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2011
10.20.3	Fourth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of February 3, 2011, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	March 30, 2011
10.20.4	Fifth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of October 18, 2011, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 29, 2012
10.20.5	Sixth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of July 19, 2012, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.20.6	Seventh Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of October 30, 2012, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 21, 2013
10.20.7	Eighth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of July 8, 2014, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.20.8	Ninth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of October 27, 2014, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015

Number	Description	Incorporated by reference herein	
		Form	Date
10.20.9	Tenth Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of January 21, 2015, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.20.10	Eleventh Amendment to Lease for facilities at 301 Binney St., Cambridge, MA, dated as of June 30, 2016, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 22, 2017
10.20.11	Sublease, dated as of July 1, 2014, by and between Biogen Idec MA Inc. and Ironwood Pharmaceuticals, Inc. to Lease for facilities at 301 Binney St., Cambridge, MA, as amended, by and between Ironwood Pharmaceuticals, Inc. and BMR-Rogers Street LLC	Annual Report on Form 10-K (File No. 001-34620)	February 18, 2015
10.21	Base Call Option Transaction Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.22	Base Call Option Transaction Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.23	Base Warrants Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.24	Base Warrants Confirmation, dated as of June 10, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.25	Additional Call Option Transaction Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015

Number	Description	Incorporated by reference herein	
		Form	Date
10.26	Additional Call Option Transaction Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.27	Additional Warrants Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and JPMorgan Chase Bank, National Association, London Branch	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
10.28	Additional Warrants Confirmation, dated as of June 22, 2015, between Ironwood Pharmaceuticals, Inc. and Credit Suisse Capital LLC, through its agent Credit Suisse Securities (USA) LLC	Quarterly Report on Form 10-Q (File No. 001-34620)	August 7, 2015
21.1*	Subsidiaries of Ironwood Pharmaceuticals, Inc.		
23.1*	Consent of Independent Registered Public Accounting Firm		
31.1*	Certification of Chief Executive Officer pursuant to Rules 13a-14 or 15d-14 of the Exchange Act		
31.2*	Certification of Chief Financial Officer pursuant to Rules 13a-14 or 15d-14 of the Exchange Act		
32.1‡	Certification of Chief Executive Officer pursuant to Rules 13a-14(b) or 15d-14(b) of the Exchange Act and 18 U.S.C. Section 1350		
32.2‡	Certification of Chief Financial Officer pursuant to Rules 13a-14(b) or 15d-14(b) of the Exchange Act and 18 U.S.C. Section 1350		
101.INS*	XBRL Instance Document		
101.SCH*	XBRL Taxonomy Extension Schema Document		
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document		
101.LAB*	XBRL Taxonomy Extension Label Linkbase Database		
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase Document		
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document		

* Filed herewith.

‡ Furnished herewith.

+ Confidential treatment granted under 17 C.F.R. §§200.80(b)(4) and 230.406. The confidential portions of this exhibit have been omitted and are marked accordingly. The confidential portions have been provided separately to the SEC pursuant to the confidential treatment request.

Management contract or compensatory plan, contract, or arrangement.

Item 16. ***Form 10-K Summary***

None.

Exhibit 10.6

IRONWOOD PHARMACEUTICALS, INC.

[AMENDED & RESTATED]
EXECUTIVE SEVERANCE AGREEMENT

This [Amended & Restated] Executive Severance Agreement (this " Agreement ") is made as of the day of [ ] [1], (the " Effective Date ") by and between Ironwood Pharmaceuticals, Inc., a Delaware corporation (the " Company "), and [ ] (the " Executive ").

WHEREAS the Executive currently serves as an employee of the Company;

[WHEREAS the Company previously provided for severance benefits for the Executive in specified circumstances pursuant to an Executive Severance Agreement, effective as of [ ] [2], by and between the Company and the Executive (the " Prior Agreement ");] and

WHEREAS the Company and the Executive [now] desire to [amend and restate the Prior Agreement to] provide for [additional] severance benefits for the Executive in specified circumstances that may arise on or after the Effective Date;

NOW, THEREFORE, in consideration of the premises and the mutual promises hereinafter set forth, the Company and the Executive agree as follows:

1. Severance Benefits .

(a) If the Executive's employment terminates by reason of an Involuntary Termination or Constructive Termination (in either case, other than a Change of Control Termination), (i) the Company will pay the Executive an amount equal to [twelve (12)] [3] months of his or her base salary, at the rate in effect as of the Termination Date ([the " Initial Salary Payment "), plus an amount equal to a maximum of six (6) months of his or her base salary for any period beginning as of the first anniversary of the Termination Date during which the Executive has not secured new, reasonably similar full-time employment (the " Additional Salary Payment ", and together with the Initial Salary Payment,] [4] the " Salary Payment ")[, provided that the Executive seeks to obtain such new employment and keep the Company informed thereof, consistent with the terms of the Separation Agreement (as such term is defined in Section 4 below)] [5], (ii) if the termination occurs prior to the payment of an annual cash incentive award from the prior completed year, the Company will pay the Executive such unpaid award to the extent the Executive would have received such award should he or she have been employed on the date such awards are paid to the rest of the Company (the " Prior Year Bonus Payment "), (iii) the Company will pay the Executive a pro rata amount of the Executive's annual cash incentive award target for the current year (pro-rated based on the percentage of the year worked prior to the termination) (the " Current Year Bonus Payment "), (iv) the Company will pay the Executive an additional amount equal to the Executive's full annual cash incentive award target for the current year [6] (the " Additional Bonus Payment ") (collectively, the Prior Year Bonus Payment, if any, the Current Year Bonus Payment, and the Additional Bonus Payment are referred to as the " Aggregate Bonus Payment "), (v) provided that the Executive timely elects continued medical coverage pursuant to Part 6 of Subtitle B of Title I of the Employee Retirement Income Security Act of 1974, as amended, the Company will permit the Executive to continue to participate in its group medical plan for [twelve (12)] [7] months following the Termination Date[(the

---

[1] Insert amendment and restatement date or effective date, as applicable.
[2] Insert original effective date.
[3] Revise to "eighteen (18)" for CEO agreement.
[4] Delete for CEO agreement.
[5] Delete for CEO agreement.
[6] Add ", multiplied by 1.5" for CEO agreement.
[7] Revise to "eighteen (18)" for CEO agreement.

" Initial COBRA Coverage "), plus any additional period during which the Executive is not eligible to participate in a group medical plan of another employer other than the Company's group medical plan, for up to six (6) months following the first anniversary of the Termination Date] [8], at the same rate that the Executive would be required to contribute toward such coverage if he or she were actively employed ([the " Additional COBRA Coverage ," and together with the Initial COBRA Coverage,] [9] the " COBRA Coverage "), and (vi) the Executive will be eligible for outplacement assistance, consistent with industry standards for similarly situated executive officers in the pharmaceutical industry, as determined by the Compensation Committee in its discretion (the " Outplacement Assistance ", collectively with the Salary Payment, the Aggregate Bonus Payment, and the COBRA Coverage, the " Cash Severance Benefits "). [For the avoidance of doubt, the Additional Salary Payment and the Additional COBRA Coverage will only be provided to the Executive if he or she has not secured new, reasonably similar full-time employment following the Termination Date.] [10]

(b) If as of immediately prior to the time of the Involuntary Termination or Constructive Termination, as applicable, the Executive has any outstanding unvested stock options, restricted stock, restricted stock units or other equity awards granted by the Company and that are subject to vesting solely based on time (" Time-Based Company Equity Awards ") then, immediately prior to the Termination Date, with respect to each Time-Based Company Equity Award, the Executive will vest in (i) the portion of the Time-Based Company Equity Award that would otherwise have vested had the Executive remained employed with the Company through the date that is [eighteen (18)] [11] months following the Termination Date (the " Extended Vesting Date ") and (ii) an additional portion of the Time-Based Company Equity Award equal to the portion that would have vested on the next regular vesting date of such Time-Based Company Equity Award after the Extended Vesting Date (the " Additional Awards ") as if the Additional Awards vested on a daily basis from the last regular award vesting date occurring prior to the Extended Vesting Date (or, if no prior vesting date has occurred, from the grant date of such Additional Awards) through the Extended Vesting Date (rounded down to the nearest whole number of shares). Any Time-Based Company Equity Awards that do not vest in accordance with the immediately preceding sentence of this Section 1(b) shall remain outstanding following the Termination Date (but shall not continue to vest in accordance with the terms of the applicable award agreement) and eligible to vest in accordance with Section 2(b) below, with any such vesting to become effective on the date of the Change of Control. Any Time-Based Company Equity Awards that do not vest pursuant to the first sentence of this Section 1(b) or pursuant to Section 2(b) shall terminate with no consideration due to the Executive. Notwithstanding anything to the contrary in the plan or award agreement under which the Company Equity Awards (as defined below) were issued, any outstanding vested stock options held by the Executive as of the Termination Date (after taking into account the accelerated vesting provided in this Section 1(b)), including any outstanding vested stock options held by the Executive that are granted in connection with the Planned Separation in substitution for or replacement of vested stock options originally granted by the Company, may be exercised by the Executive until the date that is the earlier of (1) [twenty-four (24)] [12] months after the Termination Date (or, in the event that a Public Announcement is made or a Definitive Agreement is entered into during such [twenty-four (24)] [13] month period, the later of (i) the expiration of such [twenty-four (24)] [14] month period or (ii) the first to occur of the date that is three (3) months following the Change of Control and thirty (30) days following the date on which the Company announces that such Definitive Agreement has been terminated or that the Company's efforts to consummate the Change of Control contemplated by such Public Announcement or such Definitive Agreement have been abandoned) and (2) the originally prescribed term of such stock option (together with the accelerated vesting described above, the " Equity Severance Benefits " and together with the Cash Severance Benefits, the " Severance Benefits "). To the extent any Time-Based Company Equity Awards are subject to Section 409A of the Code (" Section 409A "), vesting will be accelerated only to the extent the acceleration does not cause additional taxes or penalties under Section 409A. The acceleration, if any, of any vesting of any outstanding unvested stock options, restricted stock, restricted stock units or other equity awards

[8] Delete for CEO agreement.
[9] Delete for CEO agreement.
[10] Delete for CEO agreement.
[11] Revise to "twenty-four (24)" for CEO agreement.
[12] Revise to "thirty-six (36)" for CEO agreement.
[13] Revise to "thirty-six (36)" for CEO agreement.
[14] Revise to "thirty-six (36)" for CEO agreement.

granted by the Company to the Executive subject to (a) both time- and performance-based vesting criteria or (b) solely performance-based vesting criteria (clauses (a) and (b), collectively, " Performance-Based Company Equity Awards ", and together with the Time-Based Company Equity Awards, " Company Equity Awards ") shall be determined in accordance with the terms of the plan and award agreement under which the Performance-Based Company Equity Award was issued.

(c) Subject to Section 8 below, any [Initial] [15] Salary Payment and Aggregate Bonus Payment to which the Executive is entitled hereunder will be paid in a lump sum on the first regular payroll date of the Company following the thirty-fifth (35th) calendar day following the Termination Date (except in the event of any group termination to which a forty-five (45)-day release of claims consideration period is required under applicable law, in which case such lump-sum payment will be made on the first regular payroll date of the Company following the sixtieth (60 th) calendar day following the Termination Date)[, and any Additional Salary Payment to which the Executive is entitled hereunder will be paid in the form of salary continuation in accordance with the Company's regular payroll practices, with the first payment being made on the first regular payroll date of the Company following the date that is twelve (12) months following the Termination Date] [16] . In no event will any Outplacement Assistance provided to the Executive hereunder extend beyond the December 31 of the second year following the calendar year in which the Termination Date occurs, and any reimbursement by the Company of Outplacement Assistance expenses paid by the Executive will be paid no later than December 31 of the third year following the calendar year in which the Termination Date occurs.

2. Change of Control Severance Benefits .

(a) If the Executive's employment terminates by reason of a Change of Control Termination, in lieu of any amounts payable pursuant to Section 1(a) above, (i) the Company will pay the Executive an amount equal to [eighteen (18)] [17] months of his or her base salary, at the rate in effect as of the Termination Date (the " COC Salary Payment "), (ii) if the termination occurs prior to the payment of an annual cash incentive award from the prior completed year, the Company will pay the Executive the Prior Year Bonus Payment, (iii) the Company will pay the Executive the Current Year Bonus Payment, (iv) the Company will pay the Executive [the Additional Bonus Payment, multiplied by 1.5] [18] (the " COC Additional Bonus Payment ") (collectively, the Prior Year Bonus Payment, if any, the Current Year Bonus Payment, and the COC Additional Bonus Payment are referred to as the " COC Aggregate Bonus Payment "), (v) provided that the Executive timely elects continued medical coverage pursuant to Part 6 of Subtitle B of Title I of the Employee Retirement Income Security Act of 1974, as amended, the Company will permit the Executive to continue to participate in its group medical plan for [eighteen (18)] [19] months following the Termination Date, at the same rate that the Executive would be required to contribute toward such coverage if he or she were actively employed (the " COC COBRA Coverage "), and (vi) the Executive will be eligible for Outplacement Assistance (collectively the Outplacement Assistance, the COC Salary Payment, the COC Aggregate Bonus Payment and the COC COBRA Coverage are referred to as the " COC Cash Severance Benefits ").

(b) If as of immediately prior to the time of the Change of Control Termination, the Executive has any Time-Based Company Equity Awards, then, as of the later of (i) the date of the Change of Control or (ii) the Termination Date, all Time-Based Company Equity Awards shall have their vesting fully accelerated so as to be 100% vested and exercisable. Notwithstanding anything to the contrary in the plan or award agreement under which the Company Equity Awards were issued, any outstanding vested stock options held by the Executive as of the Termination Date (after taking into account the accelerated vesting provided in this Section 2(b)), including any outstanding vested stock options held by the Executive that are granted in connection with the Planned Separation in substitution for or replacement of vested stock options originally granted by the Company, may be exercised by the Executive until the date that is the earlier of (1) [twenty-four (24)] [20] months after the Termination Date (or, if

[15] Delete for CEO agreement.
[16] Delete for CEO agreement.
[17] Revise to "twenty-four (24)" for CEO agreement.
[18] Revise to "an additional amount equal to the Executive's full annual cash incentive award target for the current year, multiplied by 2.0" for CEO agreement.
[19] Revise to "twenty-four (24)" for CEO agreement.
[20] Revise to "thirty-six (36)" for CEO agreement.

later, the date that is three (3) months following the Change of Control) and (2) the originally prescribed term of such stock option (such extended exercise window, together with the accelerated vesting described above, the " COC Equity Severance Benefits " and together with the COC Cash Severance Benefits, the " COC Severance Benefits "). To the extent any Time-Based Company Equity Awards are subject to Section 409A, vesting will be accelerated only to the extent the acceleration does not cause additional taxes or penalties under Section 409A. The acceleration, if any, of any vesting of any Performance-Based Company Equity Awards shall be determined in accordance with the terms of the plan and award agreement under which the Performance-Based Company Equity Award was issued.

(c) Subject to Section 8 below, any COC Cash Severance Benefits that become payable will be paid as set forth in this Section 2(c). An amount equal to the [Initial] [21] Salary Payment and the Aggregate Bonus Payment will be paid in accordance with the timing set forth in Section 1(c) above. Any severance amounts determined with reference to the Executive's base salary or annual cash incentive award to which the Executive is entitled pursuant to Section 2(a) above in excess of the [Initial] [22] Salary Payment and the Aggregate Bonus Payment will be paid in a lump sum on the later of (i) the date of the Change of Control or (ii) within ten (10) calendar days following the Executive's Change of Control Termination. In no event will any Outplacement Assistance provided to the Executive hereunder extend beyond the December 31 of the second year following the calendar year in which the Termination Date occurs, and any reimbursement by the Company of Outplacement Assistance expenses paid by the Executive will be paid no later than December 31 of the third year following the calendar year in which the Termination Date occurs.

(d) For the avoidance of doubt, the Executive shall only be entitled to the COC Severance Benefits in connection with a Change of Control occurring (i) within twenty-four (24) months prior to the Termination Date or (ii) after the Termination Date as a result of a Public Announcement or a Definitive Agreement, which such Public Announcement is made or Definitive Agreement is entered into no later than that date that is six (6) months following the Termination Date. Upon the occurrence of a Change of Control Termination and a Change of Control described in the preceding sentence, the COC Severance Benefits shall be the exclusive benefits to which the Executive is entitled, and the Executive shall not be eligible to receive the Severance Benefits set forth in Section 1 hereof or any severance payments or benefits under the Company's Change of Control Severance Benefit Plan, as amended and restated on April 26, 2014, and as may be further amended from time to time (the " Severance Plan "). Further, upon the occurrence of an Involuntary Termination or Constructive Termination that does not qualify as a Change of Control Termination, the Severance Benefits shall be the exclusive benefits to which the Executive is entitled, and the Executive shall not be eligible to receive the COC Severance Benefits set forth in Section 2 hereof or any severance payments or benefits under the Severance Plan.

3. Tax Matters .

(a) Withholding . All payments made by the Company hereunder shall be reduced by any tax or other amounts required to be withheld by the Company under applicable law.

(b) Section 105(h) . In the event that, in the determination of the Company, the Company's provision of the COBRA Coverage as described in Section 1(a)(v) above or the COC COBRA Coverage as described in Section 2(a)(v) above could reasonably be expected to subject the Company to any tax or penalty under the Patient Protection and Affordable Care Act (as amended from time to time, the " ACA ") or could reasonably be expected to subject any highly compensated individual employed or formerly employed by the Company to adverse tax consequences under Section 105(h) of the Code, or applicable regulations or guidance issued under the ACA or Section 105(h) of the Code, the Company and the Executive will work together in good faith, consistent with the requirements for compliance with, or exemption from, Section 409A, to restructure such benefit in a manner intended to result in a benefit that is or remains exempt from Section 409A.

4. Separation Agreement . Notwithstanding anything herein to the contrary, the Executive acknowledges and agrees that any obligation of the Company to provide the Severance Benefits or the COC Severance Benefits is conditioned on the Executive's (i) continuing through the Termination Date to perform his or

[21] Delete for CEO agreement.
[22] Delete for CEO agreement.

her job duties satisfactorily and otherwise complying with the Company's rules and policies, (ii) continuing to comply with his or her obligations to the Company and its affiliates that survive termination of the Executive's employment, including without limitation pursuant to the Proprietary Information and Inventions and Noncompetition Agreement between the Executive and the Company (the " Restrictive Covenants Agreement "), and (iii) signing a separation agreement on terms and conditions satisfactory to the Company (the " Separation Agreement "), which will (a) contain among other terms a general release of claims, an acknowledgement of the Executive's continuing obligations to the Company under the Restrictive Covenants Agreement, and, in the Company's sole discretion, a one-year post-employment noncompetition and nonsolicitation agreement, and (b) provide that if the Executive breaches any of his or her continuing obligations to the Company under the Restrictive Covenants Agreement or as set forth in the Separation Agreement, all payments of the Severance Benefits or the COC Severance Benefits will cease, and the Executive will be required to disgorge any Severance Benefits or COC Severance Benefits that he or she previously received. The Executive shall have seven (7) business days to revoke the Separation Agreement after signing it. The Executive's timely execution and non-revocation of the Separation Agreement within sixty (60) days after the Termination Date (or such shorter period as set forth in the Separation Agreement) is a condition precedent to the Executive's right to receive the Severance Benefits or the COC Severance Benefits. The Separation Agreement will create legally binding obligations on the part of the Executive, and the Company therefore advises the Executive to seek the advice of an attorney before signing the Separation Agreement. For the avoidance of doubt, in the event the Executive is entitled to any payments pursuant to the Restrictive Covenants Agreement, the Severance Benefits or the COC Severance Benefits received in any calendar year will be reduced by the amount the Executive is paid in the same such calendar year pursuant to the Restrictive Covenants Agreement. In no event will the Executive receive duplicate benefits pursuant to the Restrictive Covenants Agreement and this Agreement.

5. Effect on Employment . Nothing contained herein limits the Company's right to terminate the Executive's employment at any time.

6. Governing Law . This Agreement shall be governed by, and construed and enforced in accordance with, the laws of the Commonwealth of Massachusetts, without giving effect to the conflict of law principles thereof. Any action brought by any party to this Agreement shall be brought and maintained in a court of competent jurisdiction in Middlesex or Suffolk Counties in the Commonwealth of Massachusetts, and each party hereby consents to the exclusive jurisdiction of such courts.

7. Assignment . Neither the Company nor the Executive may make any assignment of this Agreement or any interest herein, by operation of law or otherwise, without the prior written consent of the other; provided, however, that (a) the Executive's economic rights hereunder will automatically be assigned by the Executive to his or her estate or beneficiaries upon the death of the Executive and (b) the Company will assign its rights and obligations under this Agreement without the consent of the Executive in the event that the Company is a party to a reorganization, consolidation, merger, or sale of all or substantially all of its stock, and (c) the Company will cause an acquirer of all or substantially all of its assets to assume this Agreement. This Agreement shall inure to the benefit of and be binding upon the Company and the Executive, and their respective successors, executors, administrators, heirs and permitted assigns.

8. Section 409A .

(a) Notwithstanding anything to the contrary in this Agreement, if at the time of the termination of the Executive's employment, the Executive is a "specified employee," as defined below, any and all amounts, if any, payable under this Agreement on account of such termination of employment that constitute deferred compensation and would (but for this provision) be payable within six (6) months following the date of termination, shall instead be paid, without interest, on the next business day following the expiration of such six (6) month period or, if earlier, upon the Executive's death.

(b) For purposes of this Agreement, all references to "termination of employment" and correlative phrases shall be construed to require a "separation from service" (as defined in Section 1.409A-1(h) of the Treasury regulations after giving effect to the presumptions contained therein), and the term "specified employee"

means an individual determined by the Company to be a specified employee under Treasury regulation Section 1.409A-1(i).

(c) Each payment made under this Agreement shall be treated as a separate payment and the right to a series of installment payments, if any, under this Agreement is to be treated as a right to a series of separate payments.

(d) The parties agree that their intent is that payments and benefits under this Agreement be exempt from Section 409A to the greatest extent applicable. This Agreement shall be interpreted accordingly to be exempt from Section 409A, and all provisions of this Agreement shall be construed in a manner consistent with this intention. In the event that any payments or benefits under this Agreement are subject to Section 409A, this Agreement shall be construed in a manner consistent with the requirements for compliance with Section 409A and for avoiding taxes or penalties under Section 409A. Notwithstanding the foregoing, neither the Executive nor any beneficiary shall have any claim or right against the Company or any of its directors, officers, employees, advisers or agents by reason of any failure or asserted failure of this Agreement, in form or as administered, to comply with or qualify for exemption from Section 409A.

9. Section 4999 . In the event it is determined that the Executive is entitled to payments and/or benefits provided by this Agreement or any other amounts in the "nature of compensation" (whether pursuant to the terms of this Agreement or any other plan, arrangement, or agreement with the Company or any affiliate, any person whose actions result in a change of ownership or effective control of the Company covered by Section 280G(b)(2) of the Code or any person affiliated with the Company or such person) as a result of such change of ownership or effective control of the Company (" Payments ") would be subject to the excise tax imposed by Section 4999 of the Code (the " 280G Excise Tax "), the Company shall cause to be determined, before any amounts of the Payments are paid to the Executive, which of the following two alternative forms of payment would maximize the Executive's after-tax proceeds: (a) payment in full of the entire amount of the Payments, or (b) payment of only a part of the Payments so that the Executive receives the largest payment possible without the imposition of the 280G Excise Tax (" Reduced Payments "). If it is determined that Reduced Payments will maximize the Executive's after-tax benefit, then (i) cash compensation subject to Section 409A shall be reduced first, cash payments not subject to Section 409A shall be reduced second, non-cash compensation subject to Section 409A shall be reduced third, and then non-cash compensation not subject to Section 409A shall be reduced fourth, (ii) the Payments shall be paid only to the extent permitted under the Reduced Payments alternative, and (iii) the Executive shall have no rights to any additional payments and/or benefits constituting the Payments. Unless the Company and the Executive otherwise agree in writing, any determination required under this Section 9 shall be made in writing by independent public accountants agreed to by the Company and the Executive (the " Accountants "), whose determination shall be conclusive and binding upon the Executive and the Company for all purposes. For purposes of making the calculations required by this Section 9, the Accountants may rely on reasonable, good faith interpretations concerning the application of Sections 280G and 4999 of the Code. The Company and the Executive shall furnish to the Accountants such information and documents as the Accountants may reasonably request in order to make the required determinations. The Company shall bear all fees and expenses the Accountants may reasonably charge in connection with the services contemplated by this Section 9. Notwithstanding the foregoing, the calculations and adjustments set forth above shall not result in any delay in payment of benefits under this Agreement.

10. Amendment . This Agreement may be amended, modified or supplemented, and any obligation hereunder may be waived, only by a written instrument executed by the parties hereto; *provided* , that nothing herein shall be construed as limiting the Company's ability to amend the Severance Plan. The waiver by any party hereto of a breach of any provision of this Agreement shall not operate as a waiver of any subsequent breach. No failure on the part of any party to exercise, and no delay in exercising, any right or remedy hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any such right or remedy by such party preclude any other or further exercise thereof or the exercise of any other right or remedy. All rights and remedies hereunder are cumulative, and are in addition to all other rights and remedies provided by law, agreement or otherwise.

11. Definitions .

(a) " Cause " has the same definition as is set forth in the Company's Amended and Restated 2010 Employee, Director and Consultant Equity Incentive Plan, as in effect at the time of the Executive's employment termination; if such plan is no longer in effect at the time of such termination, Cause shall have the same definition as is set forth in the last version of such plan in effect prior to such termination.

(b) " Change of Control " means:

(i) any "person" (as such term is used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934, as amended), becomes the "Beneficial Owner" (as defined in Rule 13d-3 under the Securities Exchange Act of 1934, as amended), directly or indirectly, of securities of the Company representing more than 50% of the total voting power represented by the Company's then outstanding voting securities (excluding for this purpose any such voting securities held by the Company, or any affiliate, parent or subsidiary of the Company or any employee benefit plan of the Company) pursuant to a transaction or a series of transactions which the Company's Board of Directors does not approve;

(ii) a merger or consolidation of the Company, whether or not approved by the Company's Board of Directors, which results in the securities of the Company outstanding immediately prior thereto failing to continue to represent (either by remaining outstanding or by being converted into securities of the surviving entity) at least 50% of either (i) the combined voting power of the voting securities of the Company or such surviving entity outstanding immediately after such merger or consolidation or (ii) the total fair market value of the securities of the Company or such surviving entity outstanding immediately after such merger or consolidation;

(iii) the sale or disposition of all or substantially all of the Company's assets (or consummation of any transaction having similar effect) provided that the sale or disposition is of more than two-thirds (2/3) of the assets of the Company; or

(iv) the date a majority of the members of the Company's Board of Directors is replaced during any 12-month period by directors whose appointment or election is not endorsed by a majority of the members of the Company's Board of Directors before the date of the appointment or election; provided, however, that no individual initially appointed or elected to the Company's Board of Directors as a result of an actual or threatened election contest with respect to the Company's Board of Directors or as a result of any other actual or threatened solicitation of proxies by or on behalf of any person other than the Company's Board of Directors shall be deemed to be endorsed by a majority of the members of the Company's Board of Directors.

In any case, a Change of Control under this Section 11(b) must also meet the requirements of a change in ownership or effective control, or a sale of a substantial portion of the Company's assets in accordance with Section 409A(a)(2)(A)(v) of the Code and the applicable provisions of Treasury Regulation § 1.409A-3.

(c) " Change of Control Termination " means an Involuntary Termination or Constructive Termination, in either event during the period commencing six (6) months prior to the earlier of (i) the date that the Company first publicly announces it is conducting negotiations leading to a Change of Control (a " Public Announcement "), or (ii) the date that the Company enters into a definitive agreement that would result in a Change of Control (even though still subject to approval by the Company's stockholders and other conditions and contingencies (a " Definitive Agreement "); and ending on the earlier of (x) the date on which the Company announces that the Definitive Agreement described in clause (ii) above has been terminated or that the Company's efforts to consummate the Change of Control contemplated by the Public Announcement or the Definitive Agreement have been abandoned or (y) the date which is twenty-four months after the Change of Control.

(d) " Code " means the Internal Revenue Code of 1986, as amended.

(e) " Constructive Termination " means a termination of employment by the Executive for Good Reason; provided, that, "Constructive Termination" shall not include any termination of the employment of

the Executive (i) by the Company for Cause, (ii) as a result of the Permanent Disability of the Executive, (iii) as a result of the death of the Executive or (iv) as a result of the voluntary termination of employment by the Executive for reasons other than Good Reason. For the avoidance of doubt, (A) if the Executive is offered reasonably similar employment by a current or former subsidiary of the Company or his or her employment is transferred to a current or former subsidiary of the Company with the resulting role being reasonably similar to his or her role immediately prior to such transfer, in either case, in connection with the Planned Separation, the termination of the Executive's employment with the Company in connection with such Planned Separation shall not constitute a Constructive Termination, and (B) an offer of employment by, or the Executive's transfer of employment to, a current or former subsidiary of the Company in connection with the Planned Separation for a position similar to any position set forth on Schedule A shall not constitute a Constructive Termination.

(f) " Good Reason " means the occurrence of any of the following conditions without the Executive's express consent: (i) a material diminution in, or material interference with, the Executive's authority, duties or responsibilities, (ii) a material diminution in the Executive's total target cash compensation unless such material diminution is in connection with a proportional reduction in compensation for all or substantially all of the Company's executive officers, or (iii) the relocation of the Executive's work place for the Company to a location more than twenty-five (25) miles from the location of the work place prior to the Constructive Termination. The Executive may terminate his or her employment hereunder for Good Reason by (A) providing notice to the Company, specifying in reasonable detail the condition giving rise to the Good Reason, no later than the sixtieth (60th) day following the date that the Executive knew or should have known (after reasonable inquiry) of the occurrence of that condition, (B) providing the Company a period of sixty (60) days to remedy the condition so specified in the notice, and (C) terminating his or her employment for Good Reason within thirty (30) days following the expiration of the period to remedy if the Company fails to remedy the condition.

(g) " Involuntary Termination " means a termination of the Executive's employment by the Company without Cause; provided, that, "Involuntary Termination" shall not include a termination of the employment of the Executive (i) in connection with the sale of some or all of the assets of the Company, including the sale of a facility, division, or subsidiary of the Company, pursuant to which the purchaser offers the Executive substantially equivalent employment, the terms of which would not give rise to Good Reason, (ii) by the Company for Cause, (iii) as a result of the Permanent Disability of the Executive, (iv) as a result of the death of the Executive or (v) as a result of the voluntary termination of employment by the Executive for reasons other than Good Reason. For the avoidance of doubt, (A) if the Executive is offered reasonably similar employment by a current or former subsidiary of the Company or his or her employment is transferred to a current or former subsidiary of the Company with the resulting role being reasonably similar to his or her role immediately prior to such transfer, in either case, in connection with the Planned Separation, the Company's termination of the Executive's employment with the Company in connection with such Planned Separation shall not constitute an Involuntary Termination, and (B) an offer of employment by, or the Executive's transfer of employment to, a current or former subsidiary of the Company in connection with the Planned Separation for a position similar to any position set forth on Schedule A shall not constitute an Involuntary Termination.

(h) " Permanent Disability " means that (i) the Executive has been incapacitated by bodily injury, illness or disease so as to be prevented thereby from engaging in the performance of his or her duties, (ii) such total incapacity shall have continued for a period of six consecutive months and (iii) such incapacity will, in the opinion of a qualified physician, be permanent and continuous during the remainder of the Executive's life.

(i) " Planned Separation" means any separation of the Company's soluble guanylate cyclase business from the Company.

(j) " Termination Date " means the date of the termination of the Executive's employment by reason of an Involuntary Termination, a Constructive Termination or a Change of Control Termination.

12. Entire Agreement . This Agreement constitutes the entire agreement between the parties, and terminates and supersedes any and all prior agreements and understandings (whether written or oral) between the parties with respect to the subject matter of this Agreement, [including, without limitation, the Prior Agreement,

but] excluding the Restrictive Covenants Agreement, which shall continue in effect in accordance with its terms. The Executive acknowledges and agrees that neither the Company nor anyone acting on its behalf has made, and in executing this Agreement the Executive has not relied upon, any representations, promises or inducements except to the extent the same is expressly set forth herein.

IRONWOOD PHARMACEUTICALS, INC.

By: _____

Title: _____

ACKNOWLEDGED AND ACCEPTED:

Signature:

_____

[Name of Executive]

Schedule A

[_____]

Exhibit 21.1

List of Registrant's Subsidiaries

Ironwood Pharmaceuticals Securities Corporation, incorporated in Massachusetts, a wholly owned subsidiary.

Ironwood Pharmaceuticals GmbH, incorporated in Switzerland, a wholly owned subsidiary.

Cyclerion Therapeutics, Inc. incorporated in Massachusetts, a wholly owned subsidiary.

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements (Form S-3 Nos. 333-179430, 333-199885, and 333-221294 and Form S-8 Nos. 333-165227, 333-165228, 333-165229, 333-165230, 333-165231, 333-184396, 333-189339, 333-189340, 333-197874, 333-197875, 333-206227, 333-206228, 333-213001, 333-213002, 333-219669, 333-219670, 333-226612, and 333-226613) of our reports dated February 25, 2019, with respect to the consolidated financial statements of Ironwood Pharmaceuticals, Inc. and the effectiveness of internal control over financial reporting of Ironwood Pharmaceuticals, Inc. included in this Annual Report (Form 10-K) for the year ended December 31, 2018.

/s/ Ernst & Young LLP

Boston, Massachusetts
February 25, 2019

EXHIBIT 31.1

CERTIFICATION PURSUANT
TO RULE 13a-14(a) UNDER
THE SECURITIES EXCHANGE ACT OF 1934

I, Peter M. Hecht, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ironwood Pharmaceuticals, Inc. (the "registrant");

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2019

/s/ Peter M. Hecht
Peter M. Hecht
Chief Executive Officer

EXHIBIT 31.2

CERTIFICATION PURSUANT
TO RULE 13a-14(a) UNDER
THE SECURITIES EXCHANGE ACT OF 1934

I, Gina Consylman, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ironwood Pharmaceuticals, Inc. (the "registrant");

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2019

/s/ GINA CONSYLMAN
Gina Consylman
Chief Financial Officer

EXHIBIT 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Ironwood Pharmaceuticals, Inc. (the "Company") on Form 10-K for the period ended December 31, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Peter M. Hecht, Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, to my knowledge that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Peter M. Hecht
Peter M. Hecht
Chief Executive Officer
February 25, 2019

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

EXHIBIT 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Ironwood Pharmaceuticals, Inc. (the "Company") on Form 10-K for the period ended December 31, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Gina Consylman, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, to my knowledge that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ GINA CONSYLMAN
Gina Consylman
Chief Financial Officer
February 25, 2019

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.