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, 2020

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: 001-36740

FIBROGEN, INC.

(Exact name of registrant as specified in its charter)

Delaware	**77-0357827**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
409 Illinois Street San Francisco, CA	**94158**
(Address of principal executive offices)	**(zip code)**

Registrant's telephone number, including area code:
(415) 978-1200

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, $0.01 par value	FGEN	The 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 Section 15(d) of the 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 such files). Yes ☑ No ☐

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 the 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 has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☑

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant, computed by reference to the closing price as of the last business day of the registrant's most recently completed second fiscal quarter, June 30, 2020, was approximately $2,127.6 million. Shares of Common Stock held by each executive officer and director and stockholders known by the registrant to own 10% or more of the outstanding stock based on public filings and other information known to the registrant have been excluded since such persons may be deemed affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

The number of shares of common stock outstanding as of January 31, 2021 was 91,560,468.

DOCUMENTS INCORPORATED BY REFERENCE

Items 10, 11, 12, 13 and 14 of Part III of this Annual Report on Form 10-K incorporate information by reference from the definitive proxy statement for the registrant's 2021 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than after 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

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FORWARD-LOOKING STATEMENTS

This Annual Report filed on Form 10-K and the information incorporated herein by reference, particularly in the sections captioned "Risk Factors," "Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Business," contains forward-looking statements, which involve substantial risks and uncertainties. In this Annual Report, all statements other than statements of historical or present facts contained in this Annual Report, including statements regarding our future financial condition, business strategy and plans and objectives of management for future operations, are forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as "believe," "will," "may," "estimate," "continue," "anticipate," "contemplate," "intend," "target," "project," "should," "plan," "expect," "predict," "could," "potentially" or the negative of these terms or other similar terms or expressions that concern our expectations, strategy, plans or intentions. Forward-looking statements appear in a number of places throughout this Annual Report and include statements regarding our intentions, beliefs, projections, outlook, analyses or current expectations concerning, among other things, our ongoing and planned preclinical development and clinical trials, the timing of and our ability to make regulatory filings and obtain and maintain regulatory approvals for roxadustat, pamrevlumab and our other product candidates, our intellectual property position, the potential safety, efficacy, reimbursement, convenience clinical and pharmaco-economic benefits of our product candidates, the potential markets for any of our product candidates, our ability to develop commercial functions, our ability to operate in China, expectations regarding clinical trial data, our results of operations, cash needs, spending of the proceeds from our initial public offering, financial condition, liquidity, prospects, growth and strategies, the industry in which we operate and the trends that may affect the industry or us. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our financial condition, results of operations, business strategy and financial needs.

These forward-looking statements are subject to a number of risks, uncertainties and assumptions described in the section of this Annual Report captioned "Risk Factors" and elsewhere in this Annual Report. A summary of these risk factors can be found in the following section, however please refer to the full risk factors in Item 1A "Risk Factors". These risks are not exhaustive. Other sections of this Annual Report may include additional factors that could adversely impact our business and financial performance. Moreover, we operate in a very competitive and rapidly changing environment. New risk factors emerge from time to time, and it is not possible for our management to predict all risk factors nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in, or implied by, any forward-looking statements.

You should not rely upon forward-looking statements as predictions of future events. We cannot assure you that the events and circumstances reflected in the forward-looking statements will be achieved or occur. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance or achievements. The forward-looking statements made in this Annual Report are based on circumstances as of the date on which the statements are made. Except as required by law, we undertake no obligation to update publicly any forward-looking statements for any reason after the date of this Annual Report or to conform these statements to actual results or to changes in our expectations.

This Annual Report also contains market data, research, industry forecasts and other similar information obtained from or based on industry reports and publications, including information concerning our industry, our business, and the potential markets for our product candidates, including data regarding the estimated size and patient populations of those and related markets, their projected growth rates and the incidence of certain medical conditions, as well as physician and patient practices within the related markets. Such data and information involve a number of assumptions and limitations, and you are cautioned not to give undue weight to such estimates.

You should read this Annual Report with the understanding that our actual future results, levels of activity, performance and achievements may be materially different from what we expect. We qualify all of our forward-looking statements by these cautionary statements.

SUMMARY RISK FACTOR

The success of the Company will depend on a number of factors, many of which are beyond our control and involve risks, including but not limited to the following:

Risks Related to the Development and Commercialization of Our Product Candidates

- We are substantially dependent on the success of our lead product, roxadustat, and our second compound in development, pamrevlumab.
- As a company, we have limited commercialization experience, and the time and resources to develop such experience are significant. If we fail to achieve and sustain commercial success for roxadustat with our collaboration partners, our business would be harmed.
- Although regulatory approval has been obtained for roxadustat in China, Japan, and Chile, we may be unable to obtain regulatory approval for other countries, or such approval may be delayed or limited, due to a number of factors, many of which are beyond our control.
- The results of the FDA Cardiovascular and Renal Drugs Advisory Committee meeting may affect roxadustat's approvability or label in CKD anemia.
- Preclinical, Phase 1 and Phase 2 clinical trial results may not be indicative of the results that may be obtained in larger clinical trials.
- We do not know whether our ongoing or planned clinical trials of roxadustat or pamrevlumab will need to be redesigned based on interim results or if we will be able to achieve sufficient patient enrollment or complete planned clinical trials on schedule.
- Our product candidates may cause or have attributed to them undesirable side effects or have other properties that delay or prevent their regulatory approval or limit their commercial potential.
- Clinical trials of our product candidates may not uncover all possible adverse effects that patients may experience.
- If we or our manufacturers cannot properly manufacture sufficient product, we may experience delays in development, regulatory approval, launch or successful commercialization.
- Regulatory authorities will do their own benefit risk analysis and may reach a different conclusion than we or our partners have, and these regulatory authorities may base their approval decision on different analyses, data, and statistical methods than ours.
- Even if we are able to obtain regulatory approval of our product candidates, the label we obtain may limit the indicated uses for which our product candidates may be marketed.
- We face substantial competition in the discovery, development and commercialization of product candidates.
- No or limited reimbursement or insurance coverage of our approved products, if any, by third-party payors may render our products less attractive to patients and healthcare providers.

Risks Related to Severe Acute Respiratory Syndrome Coronavirus 2 and the Resulting Coronavirus Disease ("COVID-19")

- Our business could continue to be adversely affected by the ongoing COVID-19 global pandemic.

Risks Related to Our Reliance on Third Parties

- If our collaborations were terminated or if Astellas or AstraZeneca were to prioritize other initiatives over their collaborations with us, our ability to successfully develop and commercialize our product candidates would suffer.
- If our preclinical and clinical trial contractors do not properly perform their agreed upon obligations, we may not be able to obtain or may be delayed in receiving regulatory approvals for our product candidates.
- We currently rely, and expect to continue to rely, on third parties to conduct many aspects of our product manufacturing and distribution, and these third parties may terminate these agreements or not perform satisfactorily.
- Certain components of our products are acquired from single-source suppliers or without long-term supply agreements. The loss of these suppliers, or their failure to supply, would materially and adversely affect our business.

Risks Related to Our Intellectual Property

- If our efforts to protect our proprietary technologies are not adequate, we may not be able to compete effectively in our market.
- Intellectual property disputes may be costly, time consuming, and may negatively affect our competitive position.
- Our reliance on third parties and agreements with collaboration partners requires us to share our trade secrets, which increases the possibility that a competitor may discover them or that our trade secrets will be misappropriated or disclosed.
- The cost of maintaining our patent protection is high and requires continuous review and diligence. We may not be able to effectively maintain our intellectual property position throughout the major markets of the world.
- The laws of some foreign countries do not protect proprietary rights to the same extent as do the laws of the U.S., and we may encounter significant problems in securing and defending our intellectual property rights outside the U.S.
- Intellectual property rights do not address all potential threats to any competitive advantage we may have.

- The existence of counterfeit pharmaceutical products in pharmaceutical markets may compromise our brand and reputation and have a material adverse effect on our business, operations and prospects.

Risks Related to Government Regulation

- The regulatory approval process is highly uncertain and we may not obtain regulatory approval for our product candidates.
- Our product candidates could fail to receive regulatory approval from the FDA or other regulatory authorities.
- Our current and future relationships with customers, physicians, and third-party payors are subject to healthcare fraud and abuse laws, false claims laws, transparency laws, privacy and security laws, and other regulations. If we are unable to comply with such laws, we could face substantial penalties.
- We are subject to laws and regulations governing corruption, which will require us to maintain costly compliance programs.
- We have identified material weaknesses in our internal control over financial reporting. If we are unable to remediate these, or if we otherwise fail to maintain an effective system of internal control, it may result in material misstatements in our financial statements.
- The impact of recent U.S. healthcare reform, its potential partial or full repeal, and other changes in the healthcare industry and in healthcare spending is currently unknown, and may adversely affect our business model.
- Roxadustat is considered a Class 2 substance on the 2019 World Anti-Doping Agency Prohibited List that could limit sales and increase security and distribution costs for our partners and us.
- Our employees may engage in misconduct or improper activities, which could result in significant liability or harm our reputation.
- If we fail to comply with environmental, health or safety laws and regulations, we could incur fines, penalties or other costs.

Risks Related to Our International Operations

- We have established operations in China and are seeking approval to commercialize our product candidates outside of the U.S., and a number of risks associated with international operations could materially and adversely affect our business.
- The pharmaceutical industry in China is highly regulated and such regulations are subject to change.
- We have limited experience distributing drugs in China.
- We use our own manufacturing facilities in China to produce roxadustat API and drug product. There are risks inherent to operating commercial manufacturing facilities, and with these being our single source suppliers, we may not be able to continually meet market demand.
- As a company, we have limited experience in pharmacovigilance, medical affairs, and management of the third-party distribution logistics, and cannot assure you we will be able to meet regulatory requirements or operate in these capacities successfully.
- We and our collaboration partner in China, AstraZeneca, may experience difficulties in successfully growing and sustaining sales of roxadustat in China.
- The retail prices of any product candidates that we develop may be subject to pricing control in China and elsewhere.
- FibroGen (China) Medical Technology Development Co., Ltd. (“FibroGen Beijing”) would be subject to restrictions on paying dividends or making other payments to us, which may restrict our ability to satisfy our liquidity requirements.
- Any capital contributions from us to FibroGen Beijing must be approved by the Ministry of Commerce in China, and failure to obtain such approval may materially and adversely affect the liquidity position of FibroGen Beijing.
- We may be subject to currency exchange rate fluctuations and currency exchange restrictions with respect to our operations in China, which could adversely affect our financial performance.
- Because FibroGen Beijing’s funds are held in banks that do not provide insurance, the failure of any bank in which FibroGen Beijing deposits its funds could adversely affect our business.
- We may be subject to tax inefficiencies associated with our offshore corporate structure.
- Our foreign operations, particularly those in China, are subject to significant risks involving the protection of intellectual property.
- Uncertainties with respect to the China legal system could have a material adverse effect on us.
- Changes in China’s economic, governmental, or social conditions could have a material adverse effect on our business.
- Our operations in China subject us to various Chinese labor and social insurance laws, and our failure to comply with such laws may materially and adversely affect our business, financial condition and results of operations.

Risks Related to the Operation of Our Business

- Please see below for additional risk factors related to the operation of our Business.

There are also a variety of Risks Related to Our Common Stock

- Please see below for additional risk factors to our Common Stock.

PART I

ITEM 1. BUSINESS

OVERVIEW

We are a leading biopharmaceutical company discovering, developing and commercializing a pipeline of first-in-class therapeutics. We apply our pioneering expertise in hypoxia-inducible factor ("HIF") biology, 2-oxoglutarate enzymology, and connective tissue growth factor ("CTGF") biology to advance innovative medicines for the treatment of anemia, fibrotic disease, and cancer.

Roxadustat, our most advanced product, is an oral small molecule inhibitor of HIF-prolyl hydroxylase ("HIF-PH") activity that acts by stimulating the body's natural pathway of erythropoiesis, or red blood cell production.

We and our collaboration partner AstraZeneca AB ("AstraZeneca") continue to expand the commercialization of roxadustat (tradename: 爱瑞卓®) in the People's Republic of China ("China") where it is approved for the treatment of anemia caused by chronic kidney disease ("CKD") in non-dialysis and dialysis patients. Roxadustat was added to the National Reimbursement Drug List ("NRDL"), effective January 1, 2020. As of the end of 2020, roxadustat was listed at hospitals that represent approximately 70% of the CKD anemia market opportunity in China and we continue to focus on adding additional temporary and permanent hospital listings for roxadustat.

In Japan, our partner Astellas Pharma Inc. ("Astellas") continues the commercial launch of EVRENZO® (roxadustat). Astellas received approval of the supplemental New Drug Application ("NDA") for the use of EVRENZO in patients with anemia of CKD not on dialysis from the Pharmaceuticals and Medical Devices Agency in November 2020, and it is now approved for the treatment of anemia associated with CKD in both non-dialysis and dialysis patients.

With respect to our United States ("U.S.") NDA for roxadustat for the treatment of anemia due to CKD submitted for review in December 2019 to the U.S. Food and Drug Administration ("FDA"), in December 2020, the FDA extended the review period of the NDA by three months for FibroGen to submit additional analyses of existing roxadustat clinical data, and set a new Prescription Drug User Fee Act ("PDUFA") goal date of March 20, 2021. On March 1, 2021, the FDA informed us that the Cardiovascular and Renal Drugs Advisory Committee will hold an advisory committee meeting to review the NDA for roxadustat. The date of the advisory committee meeting has not been set. As a result of this communication, we will not receive an approval decision by the PDUFA goal date.

In May 2020, the Marketing Authorization Application ("MAA") for roxadustat for the treatment of anemia in patients with CKD, submitted by our partner Astellas, was accepted for regulatory review by the European Medicines Agency ("EMA"). Astellas expects an approval decision mid-2021.

EVRENZO® (roxadustat) has also been approved for the treatment of anemia in CKD patients on dialysis and patients not on dialysis in Chile. In collaboration with AstraZeneca, applications for marketing approval of roxadustat in CKD anemia have been submitted in Canada, Australia, Mexico, Brazil, Taiwan, South Korea, Philippines, Singapore, India, Colombia, and Thailand.

Beyond anemia in CKD, roxadustat is in Phase 3 clinical development in the U.S. and Europe and in Phase 2/3 development in China for anemia associated with myelodysplastic syndromes ("MDS").

We have completed enrollment in our Phase 2 clinical trial of roxadustat in the U.S. in chemotherapy-induced anemia ("CIA"), and we expect topline data from this study in the second half of 2021.

Pamrevlumab is our first-in-class antibody developed to inhibit the activity of CTGF, a common factor in fibrotic and proliferative disorders characterized by persistent and excessive scarring that can lead to organ dysfunction and failure. Pamrevlumab is in Phase 3 clinical development for the treatment of idiopathic pulmonary fibrosis ("IPF"), locally advanced unresectable pancreatic cancer ("LAPC"), and Duchenne muscular dystrophy ("DMD").

ROXADUSTAT FOR THE TREATMENT OF ANEMIA IN CHRONIC KIDNEY DISEASE

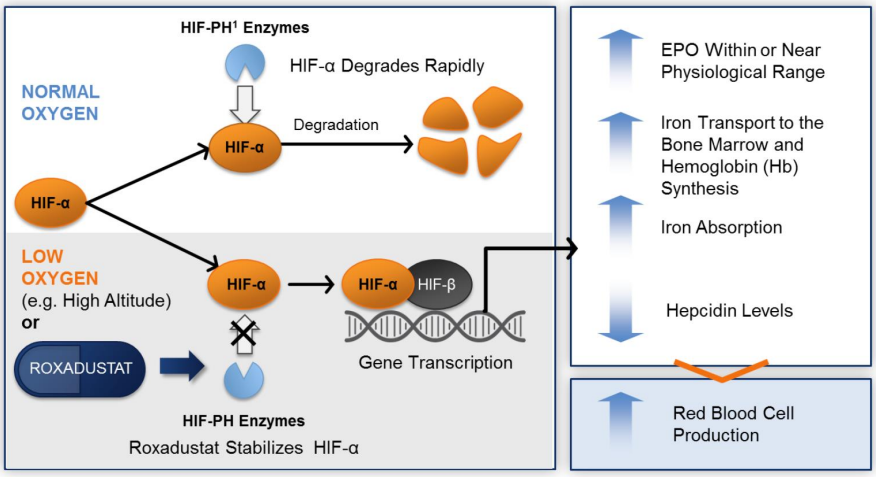
In collaboration with our partners AstraZeneca and Astellas, we have completed 16 Phase 3 studies worldwide in over 11,000 patients to support our regulatory filings in the U.S., Europe, China, and Japan.

After describing the mechanism of action of roxadustat, which is the first in a new class of potential anemia drugs, we provide some background on the CKD anemia market and a summary of our Phase 3 program along with some of the most important results.

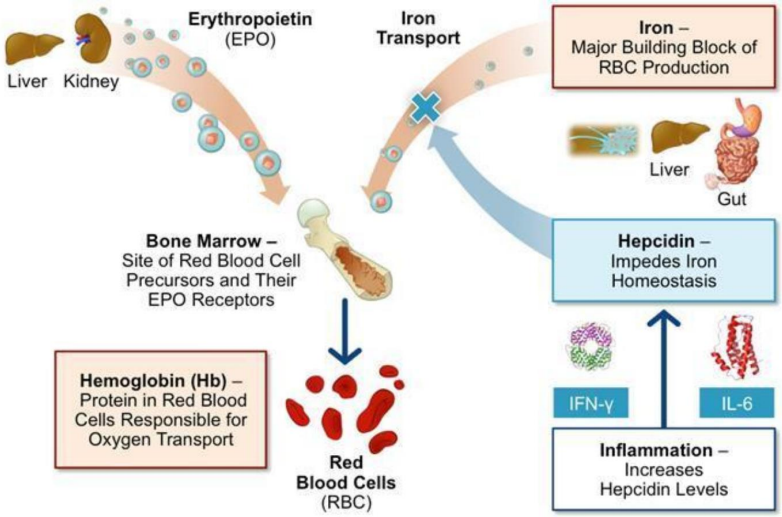
Roxadustat Mechanism of Action

Roxadustat is an orally administered reversible inhibitor of HIF-PH. Inhibition of prolyl hydroxylase stabilizes HIF, which stimulates a coordinated erythropoietic response that includes the increase of plasma endogenous erythropoietin ("EPO") levels and reduction of hepcidin, a key regulator of iron homeostasis. In healthy individuals under normal oxygen conditions, HIF-PH tags HIF-alpha for degradation and the HIF pathway is not activated. However, under low oxygen conditions, the HIF-PH enzymes cannot function and HIF-alpha accumulates. HIF-alpha then combines with HIF-beta, and the newly formed HIF complex initiates transcription of a number of genes involved in the erythropoietic process, which ultimately leads to increased oxygen delivery to tissues.

In anemia of CKD, roxadustat temporarily inhibits HIF-PH, preventing degradation of HIF-alpha and activating the HIF pathway, which stimulates a coordinated erythropoietic response that includes EPO production and the reduction of hepcidin.



The coordinated erythropoiesis activated by roxadustat includes both the stimulation of erythroid maturation, by increasing the body's production of EPO, and an increase in iron availability for hemoglobin synthesis in part through a decrease in hepcidin levels, which is particularly important in patients with inflammation. Patients taking roxadustat typically have a transient increase in circulating endogenous EPO levels at peak concentration within or near the physiologic range naturally experienced by humans adapting to hypoxic conditions such as at high altitude, following blood donation, or impaired lung function, such as pulmonary edema.



By contrast, erythropoiesis stimulating agents ("ESAs") act only to stimulate erythroid maturation without a corresponding increase in iron availability, and are typically dosed at well above the natural physiologic range of EPO. The sudden demand for iron stimulated by ESA-induced erythropoiesis can lead to functional or absolute iron deficiency. We believe these high doses of ESAs are a main cause of the significant safety issues that have been attributed to this class of drugs. In addition, the lack of a coordinated increase in iron availability with ESAs may explain the hyporesponsiveness of patients with inflammation to this class of drugs. It also explains why patients taking ESAs need more IV iron supplementation and red blood cell transfusions than patients taking roxadustat do. Not only are IV iron and blood transfusions more costly than oral iron, but both are also associated with increased risk of hospitalization and death.

The differentiated mechanism of action of roxadustat, which involves induction of the body's own natural pathways to achieve a more complete erythropoiesis, has the potential to provide a safe and effective treatment for anemia, including in the presence of inflammation, which normally limits iron availability.

Background of Anemia in Chronic Kidney Disease

Chronic kidney disease is a progressive disease characterized by gradual loss of kidney function that may eventually lead to kidney failure or end-stage renal disease requiring dialysis or a kidney transplant to survive. CKD affects 12% to 14% of the global adult population. CKD is more prevalent in developed countries but is also growing rapidly in emerging markets such as China.

Anemia is a complication of CKD and can be a serious medical condition in which patients have insufficient red blood cells and low levels of hemoglobin, a protein in red blood cells that carries oxygen to cells throughout the body. Anemia becomes increasingly common as kidney function declines and is associated with increased risk of hospitalization, cardiovascular complications and death, and frequently causes significant fatigue, cognitive dysfunction, and considerable reduction of quality of life.

There are approximately 39 million[1] CKD patients in the U.S., an estimated 6 million of whom have anemia[2].

When ESAs were introduced in 1989, they dramatically reduced the need for blood transfusions in CKD patients, which was a material development since transfusions reduce the patient's opportunity for a kidney transplant and increase the risk of infections and complications such as heart failure and allergic reactions. However, multiple randomized clinical trials with ESAs suggested safety risks of ESA therapies, and as a result, the anemia guidelines and approved labels have changed to more restrictive use of ESAs.

[1] Bikbov B et al. "Global regional and national burden of chronic kidney disease 1990-2017 - a systematic analysis for the Global Burden of Disease Study 2017." The Lancet, 395 (2020): 709-33. Web. 13 Feb. 2020.

[2] Based on 15.4% of CKD patients having anemia, (where anemia is defined as hemoglobin levels of ≤ 12 g/dL in women and ≤ 13 g/dL in men.

In the dialysis-dependent population, most patients start receiving ESAs when the patient is transitioning to dialysis care. As of the end of 2018, there were over 550,000 CKD patients on dialysis in the U.S., a large majority of whom required anemia therapy.

There were approximately 127,000 incident dialysis patients in 2018. Despite the higher risk of blood transfusions, cardiovascular events, and hospitalization in patients with anemia, only 14.6% of patients in 2018 were treated with ESAs prior to initiating dialysis notwithstanding a mean hemoglobin level of 9.3 g/dL at the time of dialysis initiation.

These treatment figures at the time of dialysis initiation demonstrate how undertreated CKD anemia is currently in non-dialysis patients. However, we believe there will be approximately 2 million addressable non-dialysis CKD anemia patients in the U.S. annually, based on the hemoglobin entry criteria in our Phase 3 clinical trials recommending initiation of treatment when a patient's hemoglobin level is less than 10 g/dL. In addition to the safety concerns raised for ESAs, which may have been a greater impediment to treatment in the non-dialysis setting, other factors which contribute to the recent historical under-treatment of anemia in non-dialysis patients are related to the form of administration and accessibility of ESA products. ESAs are typically administered by subcutaneous injections, which is more difficult outside of dialysis centers or nephrology practices where non-dialysis patients are typically treated.

Roxadustat Phase 3 CKD Anemia Clinical Program

		Number of Patients			
Study Sponsor, Number	**Comparator**	**U.S.**	**Europe**	**China**	**Japan**
NON-DIALYSIS					
FibroGen - FGCL-4592-060 (ANDES)	Placebo	-------- 922 --------			
Astellas - 1517-CL-0608 (ALPS)	Placebo	-------- 597 --------			
AstraZeneca - D5740C00001 (OLYMPUS)	Placebo	-------- 2,781 --------			
Astellas - 1517-CL-0610	Darbepoetin alfa		616		
FibroGen - FGCL-4592-808	Placebo			151	
Astellas - 1517-CL-0310	Darbepoetin alfa				334
Astellas - 1517-CL-0314	None				99
Non-Dialysis-Dependent CKD Subtotal by Region		4,300	4,916	151	433
STABLE DIALYSIS					
Astellas - 1517-CL-0613 (PYRENEES)	Epoetin alfa or Darbepoetin alfa		838		
FibroGen - FGCL-4592-806	Epoetin alfa			304	
Astellas - 1517-CL-0302	None				56
Astellas - 1517-CL-0307	Darbepoetin alfa				303
Astellas - 1517-CL-0308	None				75
Astellas - 1517-CL-0312	None				164
STABLE AND INCIDENT DIALYSIS					
AstraZeneca - D5740C00002 (ROCKIES)	Epoetin alfa	-------- 2,133 --------			
FibroGen - FGCL-4592-064 (SIERRAS)	Epoetin alfa	-------- 741 --------			
INCIDENT DIALYSIS					
FibroGen - FGCL-4592-063 (HIMALAYAS)	Epoetin alfa	-------- 1,043 --------			
Dialysis-Dependent-CKD Subtotal by Region		3,917	4,755	304	598
Total by Regulatory Approval Region		**8,217**	**9,671**	**455**	**1,031**
Combined Total to Support U.S. and Europe Approvals			**9,671**		

The primary efficacy endpoint was met in each of the pivotal studies for the U.S. NDA and Europe MAA, as shown below:

Summary of Results from Individual Phase 3 Studies of Roxadustat in CKD Anemia

Summary of Roxadustat U.S. and Europe Phase 3 Primary Efficacy Results

Study Sponsor, Number	U.S. Primary Endpoint	Endpoint Met	Europe Primary Endpoint	Endpoint Met
NON-DIALYSIS				
FibroGen - FGCL-4592-060 (ANDES)	Superior to Placebo (p<0.0001)	✓	Superior to Placebo (p<0.0001)	✓
Astellas - 1517-CL-0608 (ALPS)	Superior to Placebo (p<0.001)	✓	Superior to Placebo (p<0.001)	✓
AstraZeneca - D5740C00001 (OLYMPUS)	Statistically-Significant Improvement in Hb Change Compared to Placebo	✓	Statistically-Significant Improvement in Hb Change Compared to Placebo	✓
STABLE DIALYSIS				
Astellas - 1517-CL-0613 (PYRENEES)	Non-Inferior to ESAs	✓	Non-Inferior to ESAs	✓
STABLE AND INCIDENT DIALYSIS				
AstraZeneca - D5740C00002 (ROCKIES)	Statistically-Significant Larger Hb Increase Compared to Epoetin Alfa	✓	Statistically-Significant Larger Hb Increase Compared to Epoetin Alfa	✓
FibroGen - FGCL-4592-064 (SIERRAS)	Superior to Epoetin Alfa (p<0.0001)	✓	Superior to Epoetin Alfa (p<0.0001)	✓
INCIDENT DIALYSIS				
FibroGen - FGCL-4592-063 (HIMALAYAS)	Superior to Epoetin Alfa (p=0.0005)	✓	Non-Inferior to Epoetin Alfa	✓

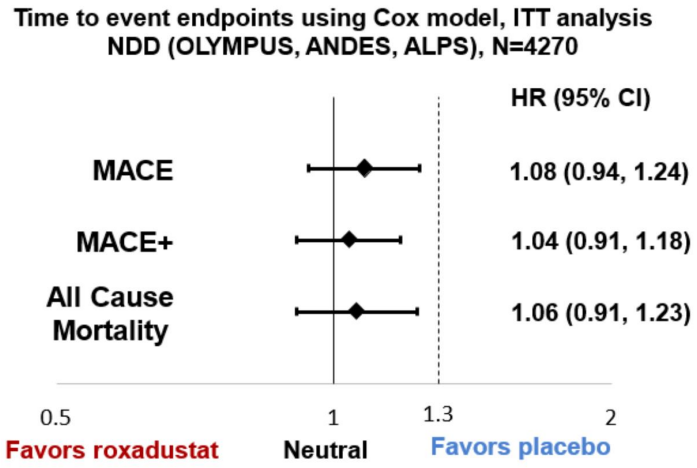
Additional Highlights from Recent Publications and Presentations of Roxadustat in CKD Anemia

Pooled Cardiovascular Safety Results

In the U.S., the primary safety endpoint is time to first major adverse cardiovascular event (“MACE”), a composite endpoint of all-cause mortality, stroke and myocardial infarction, with secondary safety endpoint of “MACE+”, a composite endpoint consisting of the three components in MACE plus heart failure or unstable angina requiring hospitalization.The below cardiovascular safety analyses reflect the pooling strategy and analytical approach that was agreed upon with the FDA and presented in scientific journals/professional meetings.

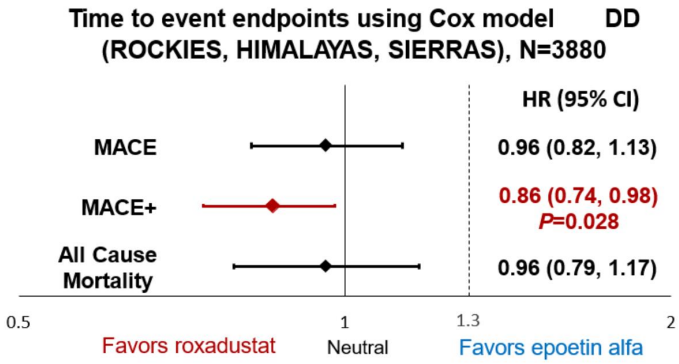
Non-Dialysis - Pooled Cardiovascular Safety Data

The intent-to-treat analyses, inclusive of data during on-treatment and post treatment long term follow-up (until a common study end date), was used in our primary cardiovascular safety analysis method for non-dialysis in the U.S. This approach accounts for the higher drop-out rate in the placebo arm. The figure below shows that in the 4,270 pooled non-dialysis patients (OLYMPUS, ANDES, and ALPS), the risk of MACE, MACE+, and all-cause mortality in roxadustat patients were comparable to that in placebo patients based on a reference non-inferiority margin of 1.3.



Dialysis - Pooled Cardiovascular Safety Data

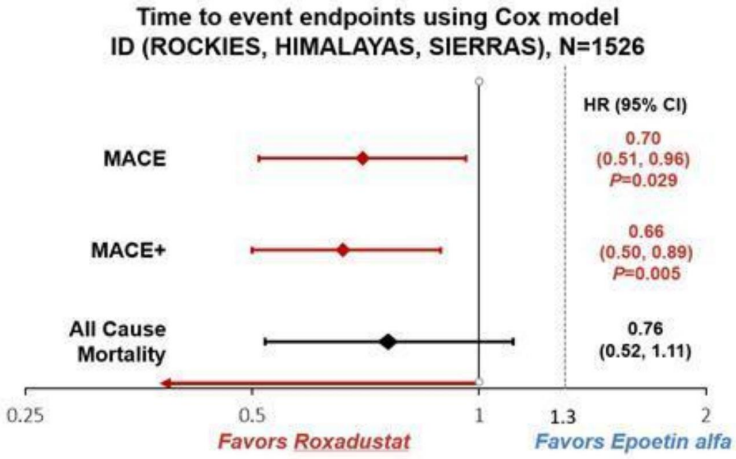
In the pooled on-treatment analysis of 3,880 dialysis patients (HIMALAYAS, SIERRAS, and ROCKIES), the risk of MACE and all-cause mortality in roxadustat patients were comparable to epoetin alfa, based on a reference non-inferiority margin of 1.3. Roxadustat lowered the risk of MACE+ by 14% compared to epoetin alfa based on a hazard ratio of 0.86 and an upper bound of 95% CI under 1.0. The hazard ratios represent a point estimate of relative risk.



Incident Dialysis Subgroup - Pooled Cardiovascular Safety Data

Data from the pooled incident dialysis patients were recently published in Kidney International Reports. (Provenzano R et al. Pooled Analysis of Roxadustat for Anemia in Patients with Kidney Failure Incident to Dialysis. KI Reports 2021. Available at https://www.kireports.org/article/S2468-0249(20)31851-9/fulltext. Accessed on 11FEB2021.)

This is a clinically important subgroup of dialysis patients who started participation in roxadustat Phase 3 studies within their first four months of dialysis initiation. In these 1,526 incident dialysis patients, roxadustat reduced the risk of MACE by 30% and MACE+ by 34%, with a trend towards lower all-cause mortality. The lower MACE and MACE+ risks (compared to epoetin alfa) are based on hazard ratios of 0.70 and 0.66, respectively, with the upper bound of 95% CI under 1.0 for both endpoints. We believe this incident dialysis subpopulation provides clinically and commercially relevant and generalizable results for comparison of roxadustat versus epoetin alfa because most incident dialysis patients (as opposed to stable dialysis patients) were ESA-naïve or had only limited exposure to ESAs prior to study entry. In addition, the initiation of anemia therapy in this incident dialysis subgroup resembles clinical practice as the vast majority of U.S. patients start anemia therapy early in dialysis treatment (during the first four months of treatment).



Iron-Metabolism Data

In non-dialysis patients, roxadustat was effective regardless of whether the “iron-repletion” criteria (ferritin >=100 ng/mL AND TSAT >=20%) were met, including the 40% of patients whose iron stores were below those required for ESA treatment. Roxadustat also increased both serum iron and transferrin, resulting in the long-term clinical stability of TSAT while increasing the absolute amount of iron available for erythropoiesis.

In dialysis patients, roxadustat treated patients required less IV iron supplementation than patients treated with ESA. Roxadustat facilitated iron transport and utilization by increasing both serum iron and iron-carrying capacity (TIBC), whereas these parameters were decreased and unchanged, respectively, with epoetin alfa. We believe these changes were most likely driven by the downstream effects of reduced hepcidin in roxadustat treated patients.

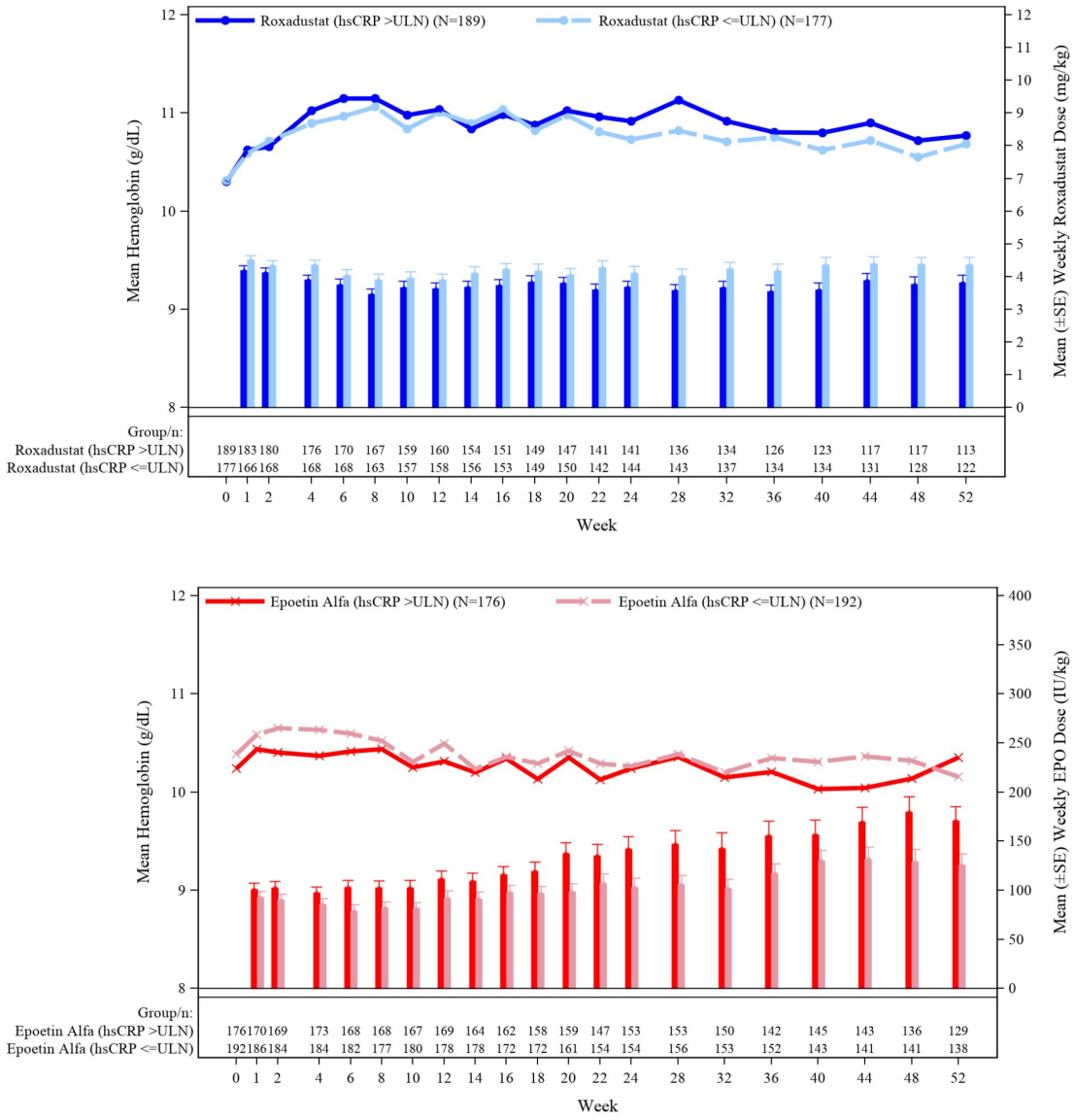
Efficacy at Raising Hemoglobin Irrespective of Iron Replete Status

In the non-dialysis pool (4,277 patients from ANDES, OLYMPUS, and ALPS), roxadustat increased hemoglobin (by 1.94 g/dL) regardless of whether patients were iron-replete (patients shown to have sufficient baseline stores of iron in their body, TSAT ≥20% and Ferritin ≥100 ng/mL) or not iron-replete.

Sierras – U.S. Only Dialysis Study

In the U.S. dialysis study SIERRAS, roxadustat raised and maintained Hb levels with stable mean doses over time regardless of baseline inflammation status, as measured by CRP levels. The dose requirement of roxadustat was not impacted by inflammation.

Mean Hb and Mean Weekly Dose of roxadustat (Top Figure) and Epoetin Alfa (Bottom Figure) Over Time in Patients with hsCRP ≤ULN or >ULN (SIERRAS)



hsCRP: high-sensitivity C-reactive protein; SE: standard error; ULN: upper limit of normal.

The proportion of patients who required at least one red blood cell transfusion in the first 52 weeks was 12.5% with roxadustat compared to 21.1% with epoetin alfa ($p<0.05$) in SIERRAS.

ROXADUSTAT FOR THE TREATMENT OF ANEMIA IN CHRONIC KIDNEY DISEASE IN CHINA

In August 2019, roxadustat (China tradename: 爱瑞卓®) received marketing authorization in China for the treatment of anemia caused by CKD in non-dialysis-dependent patients. Treatment for anemia caused by CKD in dialysis-dependent patients was approved in December 2018.

In July 2019, results from our two China Phase 3 clinical trials were published in the *New England Journal of Medicine*.[3] [4]

In December 2019, roxadustat was included on the updated NRDL released by China's National Healthcare Security Administration. Roxadustat is included on the NRDL for the treatment of anemia in CKD.

Market Opportunity

The currently available forms of treatment in China for anemia in CKD include ESAs, oral iron, intravenous iron, traditional Chinese medicine, and combinations thereof. ESAs are the largest segment, which we estimate to be approximately $275 million in sales, or approximately 80% of the total ESA market based on data from IQVIA China Hospital Pharmaceutical Audit. With the unique benefits of roxadustat to treat previously unaddressable patient populations, we believe the overall CKD anemia market will increase.

China is experiencing epidemiological changes in metabolic diseases due to economic development, urbanization and an aging population. Diabetes and hypertension are the leading causes of CKD in China, and rates have been growing over past two decades. We believe the increase in diabetes and hypertension prevalence will result in an increase of CKD anemia patients.

Dialysis-Dependent CKD

Based on the latest estimates and published data, we believe there are over 600,000 dialysis patients in China, making it the largest single-country dialysis population in the world. With the substantial growth rate of dialysis patients (over 10% per year from 2011 to 2017), the Ministry of Health and the Chinese Society of Nephrology have publicly recognized the need for further investment in dialysis infrastructure.

The prevalence of CKD dialysis patients that have anemia (defined as hemoglobin < 10g/dL) is estimated to be over 90%.

Dialysis treatment is delivered in the form of hemodialysis or peritoneal dialysis. In China, approximately 85% of dialysis patients with CKD are on hemodialysis. Hemodialysis is performed primarily in dialysis clinics within hospitals, most of which are publicly owned. This is in contrast to the U.S. where freestanding dialysis centers located outside of hospitals is common practice. With recent regulatory changes, the number of privately owned dialysis clinics is growing at a rapid pace, a trend that has provided additional capacity to meet the growing demand. The remaining 14-15% of CKD patients (approximately 100,000) are on peritoneal dialysis, which is self-administered at home by patients, a setting which roxadustat is particularly well-suited for due to its oral administration. Peritoneal dialysis patients typically visit their nephrologists on a monthly basis at the hospital for monitoring and follow-up.

[3] N. Chen, et al. "Roxadustat Treatment for Anemia in Patients Undergoing Long-Term Dialysis" N Engl J Med 381 (2019): 1011-22. DOI: 10.1056/NEJMoa1901713
[4] N. Chen, et al. "Roxadustat for Anemia in Patients with Kidney Disease Not Receiving Dialysis" N Engl J Med 381 (2019): 1001-1010. DOI: 10.1056/NEJMoa1813599

Non-Dialysis-Dependent CKD

We estimate that there are over 10 million Stage 3-5 non-dialysis CKD patients in China with anemia (defined as hemoglobin < 10g/dL). We believe the addressable population of non-dialysis patients with anemia (anemic patients that have been diagnosed and treated for CKD) is approximately 2-3 million, with 1-2 million of these addressable patients in Stages 3 and 4 and 1 million in Stage 5 non-dialysis. This Stage 5 population that is dialysis-eligible but not receiving dialysis is characteristic of developing markets like China, and presents a particular opportunity for roxadustat, as many patients have severe anemia.

Unmet Medical Need and Roxadustat Differentiation in China

We believe there is a particularly significant unmet medical need for the treatment of anemia in CKD in China. Anemia is considered a risk multiplier for CKD patients and is commonly associated with increased rates of cardiovascular events, hospitalizations, CKD progression, and death. Several of the advantages that roxadustat, as an oral therapeutic, potentially offers over ESAs are particularly suited to address the unmet medical need in each of the three categories of CKD patients in China.

We believe there is chronic under-treatment of anemia within the CKD patient population on dialysis in China due in part to under-prescription of IV iron (often necessary for ESA treatment), and lack of efficacy in patients with inflammation. The most recent treatment guidelines published by the Chinese Society of Nephrology in 2018 recommended treatment to hemoglobin 11.0 g/dL to 12.0 g/dL. Even though over 70% of hemodialysis CKD patients, and approximately 60% of peritoneal dialysis CKD patients are treated with ESAs, based on the Chinese Renal Data System in 2015, less than 60% of dialysis patients reached 10.2 g/dL.

In the non-dialysis population and peritoneal dialysis population, only a small percentage of patients receive anemia treatment, and those who do, they receive only a minimal level of treatment, including patients who are eligible for dialysis and who have severe anemia. Roxadustat, as an oral medication, can be easily administered in any setting and stored at room temperature. Injectable drugs like ESAs present a challenge in China because even subcutaneous administration is performed at hospitals and not in the home, in part due to the difficulty in refrigeration and administration of injectable medicines. Frequent hospital visits, for the sole purpose of receiving injectable ESA treatment (as well as IV iron, which is often necessary with ESA treatment), can present a substantial logistical and financial burden to patients.

In the context of the rapidly growing China pharmaceutical market, we believe that the demand for anemia therapy will continue to grow as a result of an expanding CKD population, as well as the central government’s mandate to make dialysis more available through government reimbursement and build-out of dialysis facilities. In addition, as the standard of living improves in China, the demand for access to innovative drugs increases. In this context, we believe that roxadustat is a particularly promising product for this market.

Commercialization

AstraZeneca is our commercialization partner for roxadustat in China. Under our collaboration agreement, AstraZeneca leads commercialization activities and has responsibility for sales and marketing, and market access. FibroGen has responsibility for medical affairs, manufacturing (as the Marketing Authorization Holder), and pharmacovigilance.

Pricing and Reimbursement

In December 2019, roxadustat was included for the treatment of anemia in CKD on the updated NRDL released by China’s National Healthcare Security Administration. The list is effective for a standard two-year period from January 1, 2020 to December 31, 2021. Roxadustat will be subject to price re-negotiation at the end of 2021.

We believe reimbursement is one of the two most critical market access factors for commercialization success in China, with the other being hospital listings. China is mostly a single-payor market with near universal healthcare provided by the government. Over 95% of the population receives healthcare coverage under one government-funded medical reimbursement plan or another, each with different levels of reimbursement. Commercial health insurance is available but is minimally adopted, and is seen as a supplement above and beyond government reimbursement.

Reimbursement for roxadustat will differ based on multiple factors including the CKD patient population (dialysis vs. non-dialysis), location, patient employment status, and if roxadustat is qualified into the “Critical Disease” or “Chronic Disease” insurance programs for such locations. We expect roxadustat reimbursement rates will be largely consistent with those ESAs listed on the NRDL. We believe in the next few years and in many parts of the country, reimbursement will reach a level where patient out-of-pocket costs will be in the range of 10-20% for dialysis and 30-50% for non-dialysis.

Hospital Listing

Before roxadustat can be prescribed at a government hospital, which is 90% of the market in China, it has to be carried in the hospital formulary. The process of entry into the formulary is commonly referred to as “hospital listing”. Decisions are made on a hospital-by-hospital basis, where hospital listing committees meet anywhere from every six months to every five years. Temporary listings can be used in the interim, where the head of the department could place an ad-hoc order with the formulary for a single or handful of patients for small quantities of roxadustat. These market access constraints impact all drugs, not just roxadustat. Consistent with the experience of other product launches in China, significant market uptake is usually seen a few years after launch, although in the case of roxadustat, it could be sooner given the inclusion in NRDL within 12 months of market approval.

Tendering

Tendering is a provincial level procedure. For drugs with multiple brands, it is a collective tender process for purchases by government hospitals of a medicine included in provincial or local medicine procurement catalogs. In the case of roxadustat, it is a more administrative process than for most drugs as roxadustat is currently the only drug of its class (HIF-PHI) available on the market. The tendering process of roxadustat is substantially complete in all 31 provinces in China.

ROXADUSTAT FOR THE TREATMENT OF ANEMIA IN CHRONIC KIDNEY DISEASE IN JAPAN

In Japan, our partner Astellas continues the commercial launch of EVRENZO® (roxadustat), targeting healthcare providers that care for approximately 330,000 dialysis patients across Japan. EVRENZO is now approved for the treatment of anemia associated with CKD in both non-dialysis and dialysis patients. The supplemental NDA for the use of roxadustat in patients with anemia of CKD not on dialysis was approved in November 2020 by the Pharmaceuticals and Medical Devices Agency.

In addition, the 14-day Prescription Rule that is typically in place for the first 12 months of a product’s availability in Japan was lifted in December of 2020, creating a potential catalyst for EVRENZO utilization given it is the first HIF-PH inhibitor to no longer have this limitation.

ROXADUSTAT FOR THE TREATMENT OF CHEMOTHERAPY-INDUCED ANEMIA AND ANEMIA ASSOCIATED WITH MYELODYSPLASTIC SYNDROMES

Based on roxadustat’s mechanism of action and safety and efficacy profile to date, we believe it has the potential to treat anemia associated with many other conditions, including CIA and MDS.

Background of Chemotherapy-Induced Anemia

As blood cell production in bone marrow is highly prolific, it is particularly vulnerable to the cytotoxic effects of chemotherapy used to treat cancer patients. Many chemotherapy agents directly impair hematopoiesis in bone marrow, including disruption of red blood cell production. The nephrotoxic effects of some cytotoxic agents, such as platinum-containing agents, can also result in decreased production of erythropoietin by the kidneys, further contributing to reduced red blood cell production. Radiation therapy has also been associated with hematologic toxicity.

Approximately 40% of total solid tumor cancer patients, or approximately 6.8 million people, undergo chemotherapy each year globally, including 1.7 million in the U.S. and 3.2 million in China. Between 60% and 80% of these patients develop anemia. The incidence and severity of CIA depend on a variety of factors, including the tumor type or the level of toxicity of the therapy, and further increases with each successive chemotherapy round. We believe the addressable population is approximately 600,000 in the U.S. and 500,000 in China.

ESAs have been recommended for patients experiencing CIA with the desirable goals of improvement in anemia-related symptoms and the avoidance of blood transfusion, which increases risk of infections and the risk of complications such as heart failure and allergic reactions. However, not all CIA patients respond to ESA therapy, which may be due to the etiology of their CIA or inflammatory comorbidity. ESA use also has associated toxicities, including increased thrombotic events, possible decreased survival and accelerated tumor progression, as published from randomized clinical trials and meta-analyses, that led to label restrictions and boxed warnings for ESAs in cancer populations in 2007, followed by the ESA Risk Evaluation and Mitigation Strategy ("REMS") program.

Market Opportunity for Roxadustat in Chemotherapy-Induced Anemia

ESA sales for CIA dropped significantly in the U.S. since the reported safety risks of ESA use in cancer patients in 2006, from estimated $2.5 billion in 2006 to less than $0.5 billion in 2019. During the same period, the prevalence of diagnosed CIA remained at similar levels, and is expected to grow slightly.

We believe that if our clinical program shows an acceptable safety and efficacy profile, roxadustat would have the potential to address anemia in this population of patients undergoing chemotherapy.

Clinical Development of Roxadustat in Chemotherapy-Induced Anemia

We have completed enrollment in WHITNEY, our Phase 2 clinical trial of roxadustat in the U.S. in CIA. This is a single-arm open label study investigating the efficacy and safety of roxadustat for the treatment of anemia in 92 patients receiving myelosuppressive chemotherapy treatment for non-myeloid malignancies, with a treatment duration of 16 weeks. We expect topline data from this study in the second half of 2021.

Background of Anemia in Myelodysplastic Syndromes

Myelodysplastic syndromes are a diverse group of bone marrow disorders characterized by ineffective production of healthy blood cells and premature destruction of blood cells in the bone marrow, leading to anemia. In most MDS patients, the cause of the disease is unknown.

The prevalence of MDS in the U.S. is estimated to be between 60,000 and 170,000, and continues to rise as more therapies become available and patients are living longer with MDS. Annual incidence rates are estimated to be 4.9/100,000 adults in the U.S., and 1.51/100,000 adults in China.

Anemia is the most common clinical presentation in MDS, seen in approximately 80% of MDS patients, and producing symptoms, including fatigue, weakness, exercise intolerance, shortness of breath, dizziness, and cognitive impairment.

Limitations of the Current Standard of Care for Anemia in Myelodysplastic Syndromes

Stem cell transplant is the only potentially curative therapy for MDS, but it is not feasible in most patients due to their advanced age and frailty. The high rate of severe anemia leaves recurring red blood cell transfusions as the mainstay of care in MDS patients. Transfusion can result in direct organ damage through transfusional iron overload. Transfusion dependent MDS patients suffer higher rates of cardiac events, infections and transformation to acute leukemia, and a decreased overall survival rate when compared with non-transfused patients with MDS, and decreased survival compared to an age-matched elderly population. Patients receiving red blood cell transfusions may require an iron chelator in order to address toxic elements of iron overload such as lipid peroxidation and cell membrane, protein, DNA, and organ damage.

Lower-risk MDS patients represent approximately 77% of total diagnosed MDS population. Most national and international guidelines recommend use of ESAs for anemia only in lower-risk MDS patients presenting with symptomatic anemia with serum EPO levels at or below 500 mU/mL.

Even among the eligible subpopulation, the effectiveness of ESAs in treating anemia in MDS remains limited, with the best clinical study results showing 40% to 60% erythroid response rates, in studies where significantly high doses of ESAs were used, enrolled patients had low serum EPO levels, and in lower-risk categories. New strategies to broaden the eligible population, improve anemia and maintain adequate iron balance, as well as avoidance of transfusions, are highly desired in managing patients with MDS.

Reblozyl® (luspatercept) was approved by the FDA in April 2020 for the treatment of anemia in adults with MDS with ring sideroblasts or myelodysplastic/myeloproliferative neoplasms with ring sideroblasts and thrombocytosis who need regular red blood cell transfusions and have not responded well to or cannot receive an ESA. It is the first and only erythroid maturation agent approved in the U.S., Europe, and Canada and is part of a global collaboration between Acceleron Pharma, Inc. and Bristol Myers Squibb. In 2020, Reblozyl net revenue was $274 million, including $115 million in Q4 2020.

Market Opportunity for Roxadustat in Myelodysplastic Syndromes

We believe there is a significant need for a safer, more effective, and more convenient option to address anemia in patients with lower-risk MDS. Roxadustat, our orally administered small molecule HIF-PH inhibitor, stimulates the body's natural mechanism of red blood cell production and iron hemostasis based on cellular-level oxygen-sensing and iron-regulation mechanisms. Unlike ESAs which are limited to providing exogenous EPO, roxadustat activates a coordinated erythropoietic response in the body that includes the stimulation of red blood cell progenitors, an increase in the body's production of endogenous EPO, and an increase in iron availability for hemoglobin synthesis, which we believe is important in a broad range of MDS patients. Moreover, in anemia of CKD, roxadustat has demonstrated the ability in clinical trials to increase and maintain hemoglobin levels in the presence of inflammation as measured by CRP, where ESAs have shown limited effect. We believe that roxadustat has the potential to replicate this result in MDS anemia patients, where it is not uncommon for patients to present with autoimmune and inflammatory conditions.

Clinical Development of Roxadustat in Myelodysplastic Syndromes

We are continuing to enroll MATTERHORN, our Phase 3 placebo controlled, double-blind clinical trial to evaluate the safety and efficacy of roxadustat for treatment of anemia in MDS in the U.S. and Europe. This 160-patient trial is studying roxadustat in transfusion-dependent, lower-risk MDS patients, in which subjects are randomized 3:2 to receive roxadustat or placebo three-times-weekly. The primary endpoint is the proportion of patients who achieve transfusion independence by 28 weeks with secondary endpoints and safety evaluated at 52 weeks. We expect topline data from this study in the first half of 2022.

In the open-label dose-finding component of this study, 24 lower-risk, transfusion dependent MDS patients with anemia were enrolled in three sequential starting dose cohorts (1.5 mg/kg, 2.0 mg/kg, and 2.5 mg/kg), with roxadustat doses adjusted every eight weeks per a pre-defined algorithm based on hemoglobin response. Best supporting care including red blood cell transfusion was allowed, as needed, per investigator's discretion. Patients treated with roxadustat achieved a greater than or equal to 8-week transfusion independence rate of 38% in the first 28 weeks and 54% of patients had greater than or equal to 50% reduction in red blood cell transfusion over any eight weeks, from baseline. Roxadustat was generally well tolerated in each dose cohort. The dose level of 2.5 mg/kg was selected as the starting dose for the double-blind component of the study.

In China, we are preparing to enroll the Phase 3 double-blind, placebo-controlled portion of our Phase 2/3 clinical trial to evaluate the safety and efficacy of roxadustat in non-transfusion dependent, lower-risk MDS patients with anemia. One hundred thirty-five subjects will be randomized 2:1 to receive roxadustat or placebo three-times weekly for 26 weeks. The primary endpoint for this study is percentage of patients achieving a hemoglobin response.

PAMREVLUMAB FOR THE TREATMENT OF FIBROSIS AND CANCER

We were founded to discover and develop therapeutics for fibrosis and began studying CTGF shortly after its discovery. Our accumulated discovery research efforts indicate that CTGF is a critical common element in the progression of serious diseases associated with fibrosis.

From our library of human monoclonal antibodies that bind to different parts of the CTGF protein and block various aspects of CTGF biological activity, we selected pamrevlumab, for which we have exclusive worldwide rights. We believe that pamrevlumab blocks CTGF and inhibits its central role in causing diseases associated with fibrosis. Our data to date indicate that pamrevlumab is a promising and highly differentiated product candidate with broad potential to treat a number of fibrotic diseases and cancers.

We are currently conducting Phase 3 studies in pancreatic cancer, IPF and DMD. In the U.S., the FDA has granted Orphan Drug Designation to pamrevlumab for the treatment of IPF, LAPC, and DMD. In addition, the EMA has granted Orphan Medicinal Product Designation to pamrevlumab for the treatment of DMD. Pamrevlumab has also received Fast Track designation from the FDA for the treatment of both IPF and LAPC.

Overview of Fibrosis

Fibrosis is an aberrant response of the body to tissue injury that may be caused by trauma, inflammation, infection, cell injury, or cancer. The normal response to injury involves the activation of cells that produce collagen and other components of the extracellular matrix ("ECM") that are part of the healing process. This healing process helps to fill in tissue voids created by the injury or damage, segregate infections or cancer, and provide strength to the recovering tissue. Under normal circumstances, where the cause of the tissue injury is limited, the scarring process is self-limited and the scar resolves to approximate normal tissue architecture. However, in certain disease states, this process is prolonged and excessive and results in progressive tissue scarring, or fibrosis, which can cause organ dysfunction and failure as well as, in the case of certain cancers, promote cancer progression.

Excess CTGF levels are associated with fibrosis. CTGF increases the abundance of myofibroblasts, a cell type that drives wound healing, and stimulates them to deposit ECM proteins such as collagen at the site of tissue injury. In the case of normal healing of a limited tissue injury, myofibroblasts eventually die by programmed cell death, or apoptosis, and the fibrous scarring process recedes.

Multiple biological agents and pathways have been implicated in the fibrotic process, many of which converge on CTGF, a central mediator of fibrosis. In the case of cancer, the sustained tumor-associated fibrotic tissue promotes tumor cell survival and metastasis. CTGF is a secreted glycoprotein produced by fibroblasts, endothelium, mesangial cells and other cell types, including cancers, and is induced by a variety of regulatory modulators, including TGF-ß and VEGF. CTGF expression has been demonstrated to be up-regulated in fibrotic tissues. Thus, we believe that targeting CTGF to block or inhibit its activity could mitigate, stop or reverse tissue fibrosis. In addition, since CTGF is implicated in nearly all forms of fibrosis, we believe pamrevlumab has the potential to provide clinical benefit in a wide range of clinical indications that are characterized by fibrosis.

Until recently, it was believed that fibrosis was an irreversible process. It is now generally understood that the process is dynamic and potentially amenable to reversal. Based on studies in animal models of fibrosis of the liver, kidney, muscle and cardiovascular system, it has been shown that fibrosis can be reversed. It has also been demonstrated in humans that fibrosis caused by hepatitis virus can be reversed (Chang et al. Hepatology (2010)). Additionally, we have generated data in human and animal studies that lung fibrosis progression can be slowed, arrested, or possibly reversed in some instances upon treatment with pamrevlumab.

Clinical Development of Pamrevlumab — Overview

We have performed clinical trials of pamrevlumab in IPF, pancreatic cancer, liver fibrosis and diabetic kidney disease. In eleven Phase 1 and Phase 2 clinical studies involving pamrevlumab to date, including more than 600 patients who were treated with pamrevlumab (about half of patients dosed for more than six months), pamrevlumab has been well-tolerated across the range of doses studied, and there have been no dose-limiting toxicities seen thus far.

Idiopathic Pulmonary Fibrosis

Understanding IPF and Current Therapies

IPF is a form of progressive pulmonary fibrosis, or abnormal scarring, which destroys the structure and function of the lungs. As tissue scarring progresses in the lungs, transfer of oxygen into the bloodstream is increasingly impaired. Average life expectancy at the time of confirmed diagnosis of IPF is estimated to be between three to five years, with approximately two-thirds of patients dying within five years of diagnosis. Thus, the survival rates are comparable to some of the most deadly cancers. The cause of IPF is unknown but is believed to be related to unregulated cycles of injury, inflammation and fibrosis.

Patients with IPF experience debilitating symptoms, including shortness of breath and difficulty performing routine functions, such as walking and talking. Other symptoms include chronic dry, hacking cough, fatigue, weakness, discomfort in the chest, loss of appetite, and weight loss. Over the last decade, refinements in diagnosis criteria and enhancements in high-resolution computed tomography imaging technology ("quantitative HRCT") have enabled more reliable diagnosis of IPF without the need for a lung biopsy.

The U.S. prevalence and incidence of IPF are estimated to be 44,000 to 135,000 cases, and 21,000 new cases per year, respectively, based on Raghu et al. (Am J Respir Crit Care Med (2006)) and on data from the United Nations Population Division. We believe that with the availability of technology to enable more accurate diagnoses, the number of individuals diagnosed per year with IPF will continue to increase.

There are currently two therapies approved to treat IPF in Europe and the U.S., pirfenidone and nintedanib. The approvals and subsequent launches of Esbriet (pirfenidone) and Ofev (nintedanib) have clearly shown the commercial potential in IPF. Hoffmann-La Roche ("Roche") reported worldwide sales of approximately $1.1 billion for 2019 and $1.2 billion for 2020 for Esbriet® (pirfenidone). Similarly, Boehringer Ingelheim Pharma GmbH & Co. KG ("Boehringer Ingelheim") reported total sales of approximately $1.3 billion for Ofev® (nintedanib) in 2018, and approximately $1.7 billion in 2019.

Phase 3 Clinical Development – Randomized, Double-Blind, Placebo-Controlled Trials of Pamrevlumab in IPF

We are conducting ZEPHYRUS-1, our Phase 3 trial of pamrevlumab in IPF patients, as well as our newly initiated ZEPHYRUS-2, a second IPF Phase 3 study. Both studies are double-blind, placebo-controlled Phase 3 trials targeting approximately 340 patients, each with a primary U.S. efficacy endpoint of change from baseline in forced vital capacity.

The primary efficacy endpoint in Europe for each study is disease progression (defined by a decline in forced vital capacity ("FVC") percent predicted of greater than or equal to 10% or death). Secondary endpoints will include clinical outcomes of disease progression, patient reported outcomes, and quantitative changes in lung fibrosis volume from baseline.

The COVID-19 pandemic has affected enrollment in these IPF trials, more so than our other studies due to the vulnerability of this patient population. In addition to efforts we are making in ensuring patient safety, we are also working to expand enrollment through a number of methods, including expanding the number of clinical sites in China.

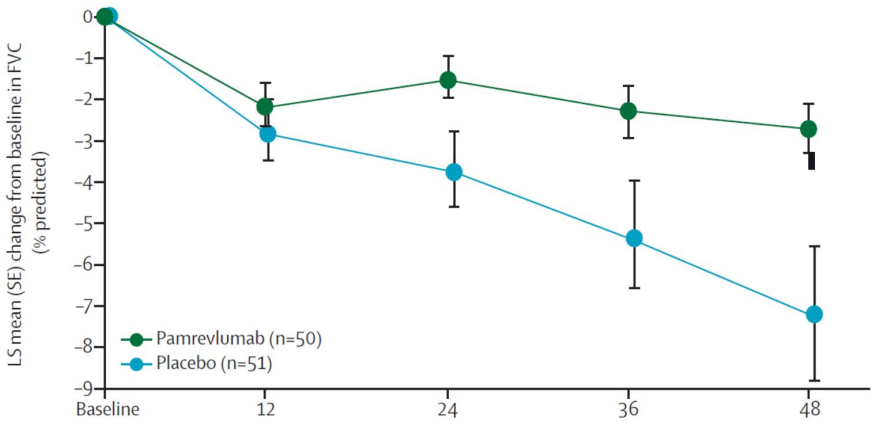
PRAISE – Study 067 – Randomized, Double-Blind, Placebo-Controlled Phase 2 Trial of Pamrevlumab in IPF

In September 2019, positive results from PRAISE, our randomized, double-blind, placebo-controlled Phase 2 clinical trial (Study 067), were published in *The Lancet Respiratory Medicine.* PRAISE was designed to evaluate the safety and efficacy of pamrevlumab in patients with mild-to-moderate IPF (baseline FVC percentage predicted of 55%), as well as topline results from two sub-studies that were added to evaluate the safety of combining pamrevlumab with approved IPF therapies.

In the double-blind, placebo-controlled 48-week portion of this study, 103 patients were randomized (1:1) to receive either 30mg/kg of pamrevlumab or placebo intravenously every three weeks. Lung function assessments were conducted at baseline and at Weeks 12, 24, 36 and 48. Quantitative HRCT assessments were performed at baseline and at Weeks 24 and 48.

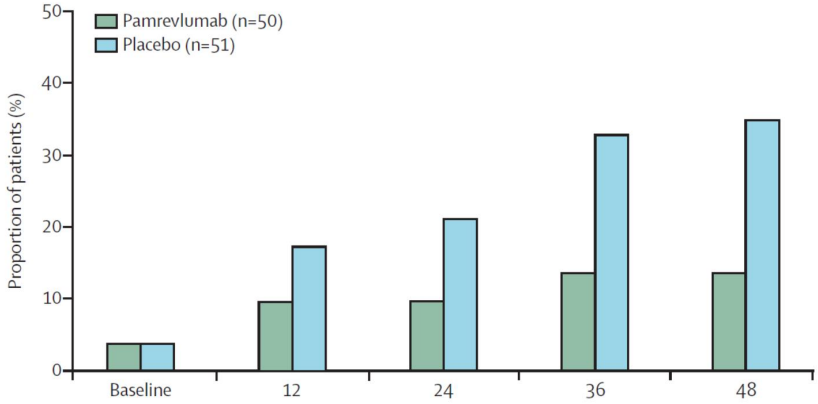
Pamrevlumab met the primary efficacy endpoint of change of FVC percent predicted, a measure of a patient's lung volume as a percentage of what would be expected for such patient's age, race, sex and height. The average decline (least squares mean) in FVC percent predicted from baseline to Week 48 was 2.9 in the pamrevlumab arm (n=50) as compared to an average decline of 7.2 in the placebo arm (n=51), a statistically significant difference of 4.33 (p=0.033).

FVC Change by Visit



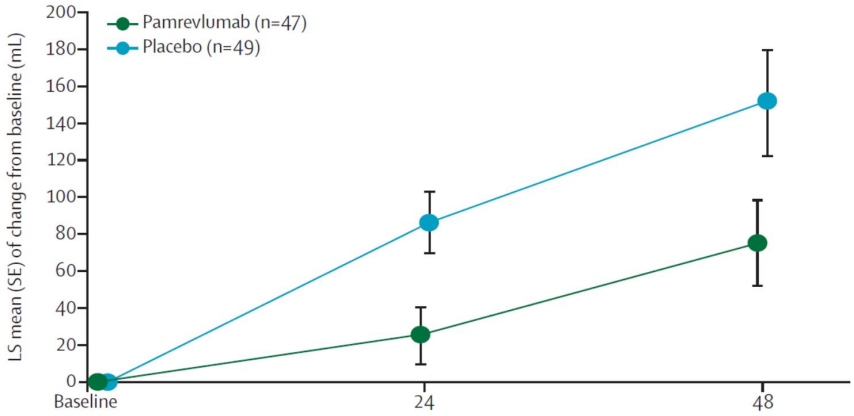
Pamrevlumab-treated patients had an average decrease (least squares mean) in FVC of 129 ml at Week 48 compared to an average decrease of 308 ml in patients receiving placebo, a statistically significant difference of 178 ml (p=0.0249, using a linear slope analysis in the intent-to-treat population). This represents a 57.9% relative difference. In addition, the pamrevlumab-treated arm had a lower proportion of patients (10%) who experienced disease progression (defined by a decline in FVC percent predicted of greater than or equal to 10% or death), than did the placebo arm (31.4%) at Week 48 (p=0.0103).

Proportion of Patients with Decline in Percentage of Predicted FVC of 10% or Greater, or Death, by Visit



In this study, we measured change in quantitative lung fibrosis ("QLF") from baseline to Week 24 and Week 48 using quantitative HRCT. The pamrevlumab arm achieved a statistically significant reduction in the rate of progression of lung fibrosis compared to placebo using HRCT to measure QLF. The change in QLF volume from baseline to Week 24 for pamrevlumab-treated patients was 24.8 ml vs. 86.4 ml for placebo, with a treatment difference of -61.6 ml, p=0.009. The change in QLF volume from baseline to 48 weeks was 75.4 ml in pamrevlumab-treated patients vs. 151.5 ml in patients on placebo, with a treatment difference of -76.2 ml, p=0.038.

Change from Baseline in Volume of Quantitative Lung Fibrosis (mL) in the Intention-to-Treat Population



As in our previous open label Phase 2 study, a correlation between FVC percent predicted and QLF was confirmed at both Week 24 and 48 in this study.

We are not aware of any other IPF therapies that have shown a statistically significant effect on lung fibrosis as measured by quantitative HRCT analysis.

The treatment effects of pamrevlumab were demonstrated not only on change in FVC, a measure of pulmonary function and IPF disease progression, and change in fibrosis using quantitative HRCT, but pamrevlumab-treated patients also showed a trend of clinically meaningful improvement in a measure of health-related quality of life using the St. George's Respiratory Questionnaire (SGRQ) vs. a reduction in quality of life seen in placebo patients over the 48 weeks of treatment. The SGRQ quality of life measurement has been validated in chronic obstructive pulmonary disease. In the patients that were evaluated by the UCSD Shortness of Breath Questionnaire, pamrevlumab-treated patients had a significant attenuation of their worsening dyspnea in comparison to placebo patients.

Pamrevlumab was well-tolerated in the placebo-controlled study. The treatment-emergent adverse events were comparable between the pamrevlumab and placebo arms and the adverse events in the pamrevlumab arm were consistent with the known safety profile of pamrevlumab. In this study, as compared with the placebo group, fewer pamrevlumab patients were hospitalized, following an IPF-related or respiratory treatment-emergent adverse event, or died for any reason.

The double-blind, active-controlled combination sub-studies were designed to assess the safety of combining pamrevlumab with standard of care medication in IPF patients. Study subjects were on stable doses of pirfenidone or nintedanib for at least three months and were randomized 2:1 to receive 30 mg/kg of pamrevlumab or placebo every three weeks for 24 weeks. Thirty-six patients were enrolled in the pirfenidone sub-study and 21 patients were enrolled in the nintedanib sub-study. Pamrevlumab appeared to be well-tolerated when given in combination with either pirfenidone or nintedanib.

Study 049 – Open-Label Phase 2 Trial of Pamrevlumab in IPF

Our completed open-label extension of Study 049, a Phase 2 open-label, dose-escalation study to evaluate the safety, tolerability, and efficacy of pamrevlumab in 89 patients with IPF, was consistent with our results from our randomized, double-blind, placebo-controlled Phase 2 clinical trial PRAISE. We presented data from our open-label Phase 2 IPF extension study (049) at the International Colloquium on Lung and Airway Fibrosis in November 2016, reporting that no safety issues were observed during prolonged treatment with pamrevlumab. Some of the 37 patients who enrolled in the extension study were treated with pamrevlumab for up to five years. Trends regarding improved or stable pulmonary function and stable fibrosis observed during the initial one-year study were also observed in the extension study.

Pancreatic Cancer

Understanding Pancreatic Cancer and the Limitations of Current Therapies

Certain solid malignant tumors have a prominent fibrosis component consisting mostly of ECM that contributes to metastasis and progressive disease. ECM is the connective tissue framework of an organ or tissue.

Pancreatic ductal adenocarcinoma, or pancreatic cancer, is the third leading cause of cancer deaths in the U.S. According to the European Commission's European Cancer Information System, there were 100,005 new cases of pancreatic cancer and 95,373 deaths from pancreatic cancer in Europe projected for 2018. The National Cancer Center of Japan estimated that there were 36,239 new cases of pancreatic cancer in 2014, increased from 24,442 cases in 2004. In its report of December 2017, Decision Resources Group estimated that the major market sales (U.S., Europe and Japan) of pancreatic cancer drugs will grow from $1.3 billion in 2016 to approximately $3.7 billion in 2026. According to the U.S. National Cancer Institute, there were an estimated 57,000 new cases of pancreatic cancer in the U.S. in 2019. Fifty percent of new cases are metastatic. Another 15-20% have localized resectable tumors. The remaining 30-35% have localized but unresectable tumors.

For those with non-resectable tumors, median survival is eight to 12 months post-diagnosis, and about 8% realize five years of survival; similar to metastatic cases. For those with resectable tumors, 50% survive 17 to 27 months post-diagnosis and ~20% report five-year survival.

Pancreatic cancer is aggressive and typically not diagnosed until it is largely incurable. Most patients are diagnosed after the age of 45, and according to the American Cancer Society, 94% of patients die within five years from diagnosis. The majority of patients are treated with chemotherapy, but pancreatic cancer is highly resistant to chemotherapy. Approximately 15% to 20% of patients are treated with surgery; however, even for those with successful surgical resection, the median survival is approximately two years, with a five-year survival rate of 15% to 20% (Neesse et al. Gut (2011)). Radiation treatment may be used for locally advanced diseases, but it is not curative.

The duration of effect of approved anti-cancer agents to treat pancreatic cancer is limited. Gemcitabine demonstrated improvement in median overall survival from approximately four to six months, and erlotinib in combination with gemcitabine demonstrated an additional ten days of survival. Nab-paclitaxel in combination with gemcitabine was approved by the FDA in 2013 for the treatment of pancreatic cancer, having demonstrated median survival of 8.5 months. The combination of folinic acid, 5-fluorouracil, irinotecan and oxaliplatin (FOLFIRINOX) was reported to increase survival to 11.1 months from 6.8 months with gemcitabine. These drugs illustrate that progress in treatment for pancreatic cancer has been modest, and there remains a need for substantial improvement in patient survival and quality of life.

The approved chemotherapeutic treatments for pancreatic cancer target the cancer cells themselves. Tumors are composed of cancer cells and associated non-cancer tissue, or stroma, of which ECM is a major component. In certain cancers such as pancreatic cancer, both the stroma and tumor cells produce CTGF which in turn promotes the proliferation and survival of stromal and tumor cells. CTGF also induces ECM deposition that provides advantageous conditions for tumor cell adherence and proliferation, promotes blood vessel formation, or angiogenesis, and promotes metastasis, or tumor cell migration, to other parts of the body.

Pancreatic cancers are generally resistant to powerful chemotherapeutic agents, and there is now growing interest in the use of an anti-fibrotic agent to diminish the supportive role of stroma in tumor cell growth and metastasis. The anti-tumor effects observed with pamrevlumab in preclinical models indicate that it has the potential to inhibit tumor expansion through effects on tumor cell proliferation and apoptosis as well as reduce metastasis.

Phase 3 Clinical Development – Randomized, Double-Blind, Placebo-Controlled Trial of Pamrevlumab in Locally Advanced, Unresectable Pancreatic Cancer

We continue to enroll LAPIS, our double-blind placebo controlled Phase 3 clinical program for pamrevlumab as a neoadjuvant therapy for LAPC. We intend to enroll approximately 260 patients, randomized at a 1:1 ratio to receive either pamrevlumab or placebo, in each case in combination with gemcitabine and nab-paclitaxel. We expect topline resection data from this study in the second half of 2022.

Study 069 – Randomized, Open-Label, Active-Controlled Phase 1/2 Trial of Pamrevlumab in Locally Advanced Pancreatic Cancer

We continue to follow patients in our ongoing open-label, randomized (2:1) Phase 1/2 trial (FGC004C-3019-069) of pamrevlumab combined with gemcitabine plus nab-paclitaxel chemotherapy vs. the chemotherapy regimen alone in patients with inoperable locally advanced pancreatic cancer that has not been previously treated. We enrolled 37 patients in this study and completed the six-month treatment period and surgical assessment at the end of 2017. The overall goal of the trial is to determine whether the pamrevlumab combination can convert inoperable pancreatic cancer to operable, or resectable, cancer. Tumor removal is the only chance for cure of pancreatic cancer, but only approximately 15% to 20% of patients are eligible for surgery.

We reported updated results from this ongoing study at the American Society of Clinical Oncology Annual Meeting in June 2018. A higher proportion (70.8%) of pamrevlumab-treated patients whose tumors were previously considered unresectable became eligible for surgical exploration than patients who received chemotherapy alone (15.4%), based on pre-specified eligibility criteria at the end of 6 months of treatment. Furthermore, a higher proportion of pamrevlumab-treated patients (33.3%) achieved surgical resection than those who received chemotherapy alone (7.7%).

In addition, this data showed improved overall survival among patients whose tumors were resected vs. not resected (NE vs. 18.56 months, p-value=0.0141) and a trend toward improved overall survival in patients eligible for surgery vs. patients who were not (27.73 vs. 18.40 months, p-value=0.0766). All of the patients on study at the time of the results reported in June 2018 continue to remain on study. No increase in serious adverse events was observed in the pamrevlumab arm and no delay in wound healing was observed post-surgery.

Patients with LAPC have median survival of less than 12 months, only slightly better than patients with metastatic pancreatic cancer, whereas patients with resectable pancreatic cancer have a much better prognosis with median survival of approximately 23 months and some patients being cured. If pamrevlumab in combination with chemotherapy continues to demonstrate an enhanced rate of conversion from unresectable cancer to resectable cancer, it may support the possibility that pamrevlumab could provide a substantial survival benefit for locally advanced pancreatic cancer patients.

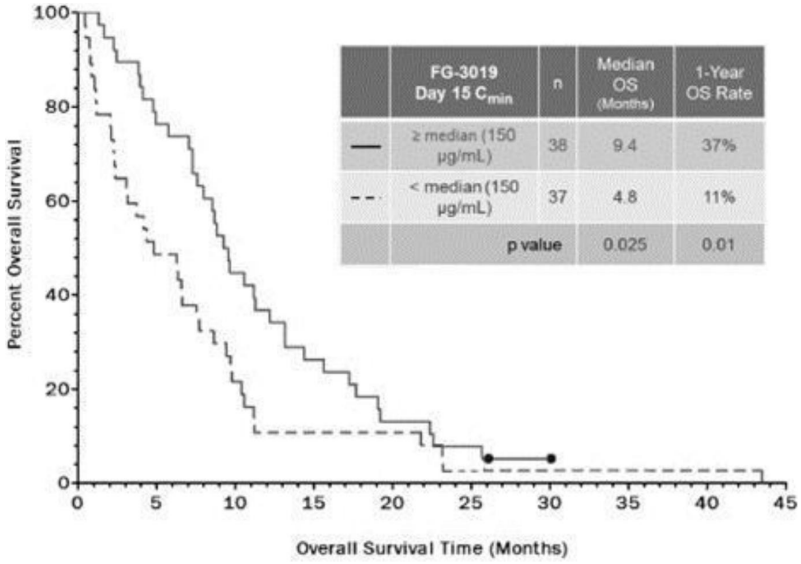
Completed Clinical Trials of Pamrevlumab in Pancreatic Cancer

We completed an open-label Phase 1/2 (FGCL-MC3019-028) dose finding trial of pamrevlumab combined with gemcitabine plus erlotinib in patients with previously untreated locally advanced (Stage 3) or metastatic (Stage 4) pancreatic cancer. These study results were published in the *Journal of Cancer Clinical Trials* (Picozzi et al., J Cancer Clin Trials 2017, 2:123). Treatment continued until progression of the cancer or the patient withdrew for other reasons. Patients were then followed until death.

Seventy-five patients were enrolled in this study with 66 (88%) having Stage 4 metastatic cancer. The study demonstrated a dose-related increase in survival. At the lowest doses, no patients survived for even one year while at the highest doses up to 31% of patients survived one year.

A post-hoc analysis found that there was a significant relationship between survival and trough levels of plasma pamrevlumab measured immediately before the second dose (Cmin), as illustrated below. Cmin greater than or equal to 150 µg/mL was associated with significantly improved progression-free survival (p=0.01) and overall survival (p=0.03) vs. those patients with Cmin less than 150 µg/mL. For patients with Cmin >150 µg/mL median survival was 9.0 months compared to median survival of 4.4 months for patients with Cmin <150 µg/mL. Similarly, 34.2% of patients with Cmin >150 µg/mL survived for longer than one year compared to 10.8% for patients with Cmin <150 µg/mL. These data suggest that sufficient blockade of CTGF requires pamrevlumab threshold blood levels of approximately 150 µg/mL in order to improve survival in patients with advanced pancreatic cancer.

Increased Pancreatic Cancer Survival Associated with Increased Plasma Levels of Pamrevlumab



The Kaplan-Meier plot provides a representation of survival of all patients in the clinical trial. Each vertical drop in the curve represents a recorded event (death) of one or more patients. When a patient's event cannot be determined either because he or she has withdrawn from the study or because the analysis is completed before the event has occurred, that patient is "censored" and denoted by a symbol (●) on the curve at the time of the last reliable assessment of that patient.

In the study, the majority of adverse events were mild to moderate, and were consistent with those observed for erlotinib plus gemcitabine treatment without pamrevlumab. There were 99 treatment-emergent serious adverse events; six of which were assessed as possibly related to the investigational drug by the principal investigator, and 93 as not related to study treatment. After investigation, it is our belief that there is no causal relationship between pamrevlumab and the treatment-emergent serious adverse events deemed possibly related by the principal investigator. We did not identify any evolving dose-dependent pattern, and higher doses of pamrevlumab were not associated with higher numbers of serious adverse events or greater severity of the serious adverse events observed.

Pamrevlumab for Duchenne Muscular Dystrophy

Understanding DMD and the Limitations of Current Therapies

In the U.S., approximately one in every 5,000 boys have DMD, and approximately 20,000 children are diagnosed with DMD globally each year. There are currently no approved disease-modifying treatments. Despite taking steroids to mitigate progressive muscle loss, a majority of children with DMD are non-ambulatory by adolescence and median survival is age 25.

DMD is an inherited disorder of one of the dystrophin genes resulting in absence of the dystrophin protein and abnormal muscle structure and function, leading to progressively diminished mobility as well as pulmonary function and cardiac function, which result in early death. Constant myofiber breakdown results in persistent activation of myofibroblasts and altered production of ECM resulting in extensive fibrosis in skeletal muscles of DMD patients. Desguerre et al. (2009) showed that muscle fibrosis was the only myo-pathologic parameter that significantly correlated with poor motor outcome as assessed by quadriceps muscle strength, manual muscle testing of upper and lower limbs, and age at ambulation loss. Numerous pre-clinical studies including those in the mdx model of DMD suggest that CTGF contributes to the process by which muscle is replaced by fibrosis and fat and that CTGF may also impair muscle cell differentiation during muscle repair after injury.

Phase 3 Clinical Development – LELANTOS, a double-blind, placebo-controlled trial in non-ambulatory DMD patients

In the third quarter of 2020, we initiated a Phase 3 clinical trial, LELANTOS 1, evaluating pamrevlumab as a treatment for DMD. LELANTOS 1 is a double-blind, placebo-controlled trial in approximately 90 non-ambulatory DMD patients. Patients will be randomized at a 1:1 ratio to pamrevlumab or placebo and have a treatment period of 52 weeks. The primary endpoint will assess change in upper limb strength and additional endpoints will include pulmonary, performance, cardiac, and fibrosis assessments.

We also plan to initiate a Phase 3 clinical trial, LELANTOS 2, evaluating pamrevlumab in 70 ambulatory DMD patients.

We expect topline data from these studies in the second half of 2022.

Phase 2 Open-Label Trial of Pamrevlumab in DMD

In June 2019 at the Parent Project Muscular Dystrophy meeting, we reported topline results from this 21 patient open-label single-arm trial in non-ambulatory DMD patients. This one-year administrative analysis compared our Phase 2 data to previously published natural disease history studies of DMD patients. While we cannot make direct comparisons between our trial and previously published data due to, among other things, differences in subject numbers, baseline characteristics, inclusion/exclusion criteria, treatment protocols, and analysis methods, we are encouraged by the data obtained so far. Pamrevlumab was well tolerated in this study.

In pulmonary function tests, the results from our study indicate a potential reduction in the 1-year decline in FVC percent predicted from baseline for pamrevlumab-treated patients when compared to FVC data of DMD patients (whether such patients were taking steroids or not) published in 2019 by Ricotti. In the 2019 Ricotti study, the DMD patients were treated with steroids only. Similarly, all of the patients in our Phase 2 pamrevlumab trial were on steroids. In addition, pamrevlumab showed less decline in both percent predicted forced expiratory volume as compared to previously published study results of Meier in 2016, and in percent predicted peak expiratory flow rate, compared to what was observed in the study by Ricotti in 2019.

Our data showed an increase in cardiac function, measured by mean change of left ventricular ejection fraction (“LVEF”), of 0.29% from baseline for pamrevlumab-treated patients. Whereas, data published in 2018 by McDonald of DMD patients only on steroids showed a mean LVEF decline of 0.82% from baseline in one year.

In muscle function tests, the majority of the results of this Phase 2 study showed the mean change from baseline in pamrevlumab-treated patients were more favorable than previously published data. Our results showed a positive increase in grip-strength score in both dominant and non-dominant hands at one year of treatment with pamrevlumab, while earlier results from a 2015 study by Seferian showed a decline at one year as expected. In the performance of the upper limb (“PUL”) test specifically developed for DMD patients, pamrevlumab-treated patients had a mean change from baseline of -1.53. In the 2019 study by Ricotti of DMD patients taking either nothing or only steroids, the annual mean change in the PUL test was -4.13. Furthermore, in our study a strong correlation between change in biceps brachii T2-mapping and change in PUL score was observed, demonstrating stabilization and even possible improvement in the muscle fibrosis burden.

Commercialization Strategy for Pamrevlumab

Our goal, if pamrevlumab is successful, is to be a leader in the development and commercialization of novel approaches for inhibiting fibrosis and treating certain forms of cancer and muscular dystrophy diseases. To date, we have retained exclusive worldwide rights for pamrevlumab. We have commenced brand development activities for pamrevlumab and will be advancing these efforts in preparation for potential launches in IPF, LAPC and DMD, consistent with the approaches of companies with a product in late-stage clinical development.

Research at FibroGen

Our research programs at FibroGen are grounded in our three areas of expertise: HIF biology, 2-oxoglutarate enzymology, and CTGF biology.

We have applied our expertise in the field of HIF-PH inhibition to develop an understanding of other areas of HIF biology with important therapeutic implications. This consistent progression of discovery has led to findings relating to HIF-mediated effects associated with inflammatory pathways, various aspects of iron metabolism, insulin sensitivity and glucose and fat metabolism, neurological disease, and ischemic injury. There are at least three different HIF-PH enzymes that are known to regulate the stability of HIF — these enzymes are commonly referred to in the scientific literature as PHD1, PHD2 and PHD3. Studies of genetically modified mice, in which the individual HIF-PH enzymes have been deleted, have revealed that PHD2 plays a major role in the regulation of erythropoiesis by HIF. In contrast, PHD1 and PHD3 appear to play less important roles in HIF-mediated erythropoiesis, but instead have been implicated in other important biological pathways. We believe that both pan-PHD and PHD-selective inhibitors could have important therapeutic applications beyond anemia.

The HIF-PH enzymes that are the targets of roxadustat belong to a broader family of enzymes known as 2-oxoglutarate (2OG)-dependent oxygenases. In humans, this family comprises more than 60 members that play important roles in a diverse range of biological processes including collagen biosynthesis, oxygen sensing, epigenetic regulation, nucleic acid modification/repair, and lipid metabolism. The first members of this enzyme family to be characterized were the collagen prolyl hydroxylases, which play a critical role in the biosynthesis of collagen and as a result, are potential targets for the treatment of fibrotic disease. Other members of the 2OG-dependent oxygenase family with relevance to human disease include the Jumonji domain-containing histone demethylases, which are emerging cancer targets.

The fact that all members of the 2OG-dependent oxygenase enzyme family use 2OG as a co-substrate makes them viable targets for small molecule inhibitors that compete with 2OG. FibroGen has been a leader in inhibition of enzymes belonging to this family, and our internal medicinal chemistry efforts have generated a library of novel compounds designed to target the 2OG-dependent oxygenase family.

Finally, we have applied our knowledge of CTGF to investigate additional applications of agents that interfere with the role of this protein in disease. In some instances, we are exploring direct engagement of CTGF itself. In other instances, we are studying the regulation of CTGF.

COLLABORATIONS

Our revenue to date has been generated primarily from our collaboration agreements with Astellas and AstraZeneca for the development and commercialization of roxadustat. In addition, we started roxadustat commercial sales in China in the third quarter of 2019. For fiscal year ended December 31, 2020, 58% of our revenue was related to our collaboration agreements, and 42% of our revenue was from roxadustat commercial sales in China. For the fiscal years ended December 31, 2019 and 2018, substantially all of our revenue was related to our collaboration agreements.

Astellas

We have two agreements with Astellas for the development and commercialization of roxadustat, one for Japan, and one for Europe, the Commonwealth of Independent States, the Middle East and South Africa. Under these agreements, we provided Astellas the right to develop and commercialize roxadustat for anemia in these territories.

We share responsibility with Astellas for clinical development activities required for U.S. and Europe regulatory approval of roxadustat, and share equally those development costs under the agreed development plan for such activities. Astellas will be responsible for clinical development activities and all associated costs required for regulatory approval in all other countries in the Astellas territories. Astellas will hold and have responsibility for regulatory filings in its territories. We are responsible, either directly or through our contract manufacturers, for the manufacture and supply of all quantities of roxadustat to be used in development and commercialization under the agreements, other than roxadustat drug product for Japan. Astellas is responsible for roxadustat commercialization activities in the Astellas territories.

AstraZeneca

We also have two agreements with AstraZeneca for the development and commercialization of roxadustat for anemia, one for China (the "China Agreement"), and one for the U.S. and all other countries not previously licensed to Astellas (the "U.S./RoW Agreement"). Under these agreements, we provided AstraZeneca the right to develop and commercialize roxadustat for anemia in these territories. We share responsibility with AstraZeneca for clinical development activities required for U.S. regulatory approval of roxadustat, and FibroGen will transfer the U.S. NDA to AstraZeneca upon approval. AstraZeneca will hold the equivalent regulatory filings in the other licensed countries.

In China, our subsidiary FibroGen (China) Medical Technology Development Co., Ltd. ("FibroGen Beijing") has conducted the development work for CKD anemia and will continue to hold all of the regulatory licenses issued by China regulatory authorities and be primarily responsible for regulatory, clinical and manufacturing. China development costs are shared 50/50. AstraZeneca is also responsible for 100% of development expenses in all other licensed territories outside of China. We are responsible, ourselves and through our contract manufacturers, for the manufacture and supply of all quantities of roxadustat to be used in development and commercialization under the AstraZeneca agreements.

Under the China Agreement, which is conducted through FibroGen China Anemia Holdings, Ltd. ("FibroGen Cayman"), FibroGen Beijing, and FibroGen International (Hong Kong) Limited (collectively, "FibroGen China"), the commercial collaboration is structured as a 50/50 profit share, which was restructured in the third quarter of 2020. Pursuant to an Amendment to the China Agreement, the parties agreed to establish a jointly owned entity to conduct distribution. FibroGen Beijing will manufacture and transfer commercial product to the distribution entity in exchange for a transfer price at a percentage of net sales. AstraZeneca will conduct sales and marketing activities in China for roxadustat, which will be billed to the distribution entity, subject to a cap of a percentage of roxadustat net sales until AstraZeneca has recouped its sales and marketing expenses, at which time it will bill actual expenses, subject to the cap.

Additional Information Related to Collaboration Agreements

Additional information related to our collaboration agreements is set forth in Item 7 of this Annual Report on Form 10-K, and Note 4, *Collaboration Agreements and Revenues*, to our consolidated financial statements under Item 8 of this Annual Report. Information about collaboration partners that accounted for more than 10% of our total revenue or accounts receivable for the last three fiscal years is set forth in Note 15, *Segment and Geographic Information*, to our consolidated financial statements under Item 8 of this Annual Report.

COMPETITION

The pharmaceutical and biotechnology industries are highly competitive, particularly in some of the indications we are developing drug candidates, including anemia in CKD, IPF, pancreatic cancer, and DMD. We face competition from multiple other pharmaceutical and biotechnology companies, many of which have significantly greater financial, technical and human resources and experience in product development, manufacturing and marketing. These potential advantages of our competitors are particularly a risk in IPF, pancreatic cancer, and DMD, where we do not currently have a development or commercialization partner.

We expect any products that we develop and commercialize to compete based on, among other things, efficacy, safety, convenience of administration and delivery, price, the level of generic competition, and the availability of reimbursement from government and other third-party payors.

When any of our product candidates are approved, they will compete with currently marketed products, and product candidates that may be approved for marketing in the future, for treatment of the indications described below.

In addition, we will likely face competition from other companies developing treatments of other anemia indications that we may also seek to pursue in the future or that may be sold in indications we are pursuing but for which they are not yet approved. We may face competition for patient recruitment, enrollment for clinical trials, and potentially in commercial sales. There may also be new therapies for renal-related diseases that could limit the market or level of reimbursement available for roxadustat.

Roxadustat

Approved Medicines

Drugs that will compete with roxadustat are expected to include ESAs, particularly in those patient segments where ESAs are used. Some of the available ESAs include epoetin alfa (EPOGEN® marketed by Amgen Inc. in the U.S., Procrit® and Erypo®/Eprex®, marketed by Johnson & Johnson, Inc. and Espo® marketed by Kyowa Hakko Kirin in Japan and China), darbepoetin (Amgen/Kyowa Hakko Kirin's Aranesp® and NESP®) and Mircera® marketed by Roche outside the U.S. and by Vifor Pharma, a Roche licensee, in the U.S. and Puerto Rico, as well as biosimilar versions of these currently marketed ESA products. ESAs have been used in the treatment of anemia in CKD for more than 30 years, serving a significant majority of dialysis patients. While non-dialysis CKD anemia patients who are not under the care of nephrologists, including those with diabetes and hypertension, do not typically receive ESAs and are often left untreated, some patients under nephrology or hematology care may be receiving ESA therapy. It may be difficult to encourage healthcare providers and patients to switch to roxadustat from products with which they have become familiar.

Biosimilars

The first biosimilar ESA, Pfizer's Retacrit® (epoetin zeta), entered the U.S. market in November 2018. Market penetration of Retacrit and the potential addition of other biosimilar ESAs currently under development may alter the competitive and pricing landscape of anemia therapy in CKD patients on dialysis under the end-stage renal disease bundle. The patents for Amgen's EPOGEN® (epoetin alfa) expired in 2004 in Europe, and the final material patents in the U.S. expired in May 2015. Several biosimilar versions of currently marketed ESAs are available for sale in Europe, China and other territories. In the U.S., a few ESA biosimilars are currently under development. Sandoz, a division of Novartis, markets Binocrit® (epoetin alfa) in Europe and may file a biosimilar Biologics License Application in the U.S.

Product Candidates in Development

We may also face competition from potential new anemia therapies currently in clinical development, including in those patient segments not adequately addressed by ESAs. Companies that are currently developing HIF-PH inhibitors for anemia in CKD indications include GlaxoSmithKline plc ("GSK"), Bayer Corporation ("Bayer"), Akebia Therapeutics, Inc. ("Akebia"), Otsuka Pharmaceutical ("Otsuka"), Akebia's partner in the U.S. and Europe, Japan Tobacco, and Zydus Cadila (India) ("Zydus"). Akebia has completed Phase 3 studies in CKD patients on dialysis and not on dialysis in the U.S., as well as a Phase 3b, randomized, open-label, active-controlled trial evaluating the efficacy and safety of oral vadadustat once daily and three times weekly for the maintenance treatment of anemia in hemodialysis subjects converting from erythropoiesis stimulating agents. The study completion date is estimated to be May 2022. Akebia announced an additional Phase 3 study evaluating the efficacy and safety of dose conversion from a long-acting erythropoiesis stimulating agent (Mircera®) to three times weekly oral vadadustat for the maintenance treatment of anemia in hemodialysis subjects. The estimated study start date is February 2021. Akebia has publicly stated their intent to file the vadadustat NDA in the U.S. in the second quarter of 2021.

Japan

In Japan, Mitsubishi Tanabe Pharmaceutical Corporation, Akebia's collaboration partner, received approval for vadadustat on June 29, 2020 for the treatment of anemia of CKD patients on and not on dialysis. GSK received approval for daprodustat in Japan on June 29, 2020 for the treatment of anemia of CKD patients on and not on dialysis. Price listing for the launch in Japan of both vadadustat and daprodustat occurred in the third quarter of 2020, with pricing in line with roxadustat pricing. GSK is also conducting global Phase 3 studies in CKD patients on dialysis and not on dialysis, and expects to complete those studies by March 2022. GSK and Kyowa Hakko Kirin announced in November 2018 that the two companies signed a strategic commercialization deal in Japan for daprodustat. Bayer has completed global Phase 2 studies and its HIF-PH inhibitor is now in Phase 3 development in CKD populations on dialysis and not on dialysis in Japan. Japan Tobacco received approval in Japan for enarodustat for the treatment of anemia in CKD patients on dialysis and not on dialysis, to be sold by Torii Pharmaceuticals Ltd as ENAROY®. Japan Tobacco and its partner JW Pharmaceuticals started a Phase 3 study in dialysis patients in Korea in 2019. Zydus started Phase 3 studies in dialysis and non-dialysis CKD patients in India in 2019.

China

In China, biosimilars of epoetin alfa are offered by Chinese pharmaceutical companies such as EPIAO marketed by 3SBio Inc. as well as more than 15 other local manufacturers. We may also face competition by HIF-PH inhibitors from other companies such as Akebia, Bayer, and GSK, which was authorized by the National Medical Products Administration ("NMPA") to conduct trials in China to support its ex-China regulatory filings. Two domestic companies, Jiangsu Hengrui Medicine Co., Ltd. and Guandong Sunshine Health Investment Co., Ltd, have been permitted by the NMPA to conduct clinical trials for CKD anemia patients both on dialysis and not on dialysis, and 3SBio Inc. has submitted a clinical trial application to the NMPA to initiate trials for their HIF-PH inhibitor. Another domestic company, China Medical System Holdings Ltd., in-licensed desidustat, a compound that is currently in Phase 3 trials in India, from Zydus for greater China in January 2020. In January 2021, China Medical System Holdings Ltd. was granted approval by the NMPA in China to begin trials for desidustat in patients with anemia of CKD, including dialysis and non-dialysis patients. Shenzhen Salubris Pharmaceutical Co., Ltd., a domestic company in China, has in-licensed enarodustat from Japan Tobacco and received NMPA approval in the third quarter of 2020 to initiate Phase 3 studies. Akebia announced in April 2017 an expansion of their U.S. collaboration with Otsuka to add markets, including China. 3SBio Inc. announced in 2016 its plan to begin a Phase 1 clinical trial of a HIF-PH inhibitor for the China market.

CIA and MDS

In July 2020, Zydus received approval from the FDA to begin a Phase 1 study of desidustat for the treatment of CIA, which could potentially be competitive with roxadustat within this indication.

Reblozyl® (luspatercept) was approved by the FDA in April 2020 for the treatment of anemia in adults with MDS with ring sideroblasts or myelodysplastic/myeloproliferative neoplasms with ring sideroblasts and thrombocytosis who need regular red blood cell transfusions and have not responded well to or cannot receive an ESA. It is the first and only erythroid maturation agent approved in the U.S., Europe, and Canada and is part of a global collaboration between Acceleron Pharma, Inc. and Bristol Myers Squibb. In 2020, Reblozyl net revenue was $274 million, including $115 million in Q4 2020.

Large Dialysis Organizations

The majority of the current CKD anemia market focuses on dialysis patients, who visit dialysis centers on a regular basis, typically three times a week, and anemia therapies are administered as part of the visit. Two of the largest operators of dialysis clinics in the U.S., DaVita Healthcare Partners Inc. ("DaVita"), and Fresenius Medical Care AG & Co. KGaA ("Fresenius"), collectively provide dialysis care to more than 80% of U.S. dialysis patients, and therefore have historically secured long-term contracts including rebate terms with Amgen. DaVita has a six-year sourcing and supply agreement with Amgen effective through 2022. Fresenius' contract with Amgen expired in 2015, following which Fresenius is providing Roche's ESA Mircera® to a significant portion of its U.S. dialysis patients. Successful penetration in this market may require our partner AstraZeneca to enter into an agreement with Fresenius, DaVita, or other dialysis organizations, on favorable pricing terms to each party.

Pamrevlumab

We are currently in Phase 3 development of pamrevlumab in IPF, locally advanced pancreatic cancer, and DMD. Most of our competitors have significantly more resources and expertise in development, commercialization and manufacturing, particularly due to the fact that we have not yet established a partnership for pamrevlumab. For example, both Roche and Boehringer Ingelheim, which market products for the treatment of IPF in the U.S., have successfully developed and commercialized drugs in various indications and have built sales organizations that we do not currently have; both have more resources and more established relationships when competing with us for patient recruitment and enrollment for clinical trials or, if we are approved, in the market.

Idiopathic Pulmonary Fibrosis

If approved and launched commercially to treat IPF, pamrevlumab is expected to compete with Roche's Esbriet® (pirfenidone), and Boehringer Ingelheim's Ofev® (nintedanib). We believe that if pamrevlumab can be shown to safely stabilize or reverse lung fibrosis, and thus stabilize or improve lung function in IPF patients, it can compete with pirfenidone and nintedanib for market share in IPF. However, it may be difficult to encourage treatment providers and patients to switch to pamrevlumab from a product with which they are already familiar. We may also face competition from potential new IPF therapies in recruitment and enrollment in our clinical trials and potentially in commercialization.

Pamrevlumab is administered via infusion, which may be more expensive and less convenient than small molecules such as nintedanib and pirfenidone. Other potential competitive product candidates in various stages of development for IPF include Kadmon Holdings, Inc.'s KD025, Liminal BioSciences' PBI-4050, and Roche/Promedior, Inc.'s PRM-151.

Pancreatic Cancer

We are developing pamrevlumab to be used in combination with Abraxane® (nab-paclitaxel) and gemcitabine in pancreatic cancer. Celgene's Abraxane was launched in the U.S. and Europe in 2013 and 2014, respectively, and was the first drug approved in this disease in nearly a decade. In 2015, Merrimack Pharmaceuticals Inc. ("Merrimack") received FDA approval for the use of ONIVYDE (irinotecan liposome injection, now licensed to Ipsen) for the treatment of patients with metastatic adenocarcinoma of the pancreas after disease progression following gemcitabine-based therapy, and the combination therapy with Abraxane and gemcitabine became the first-line standard of care in these patients. As treatments for pancreatic cancer have shown limited success to date, combination therapies are expected, but the incremental cost may slow a new product adoption in the market, at least until the generic versions of Abraxane becomes available. In addition, we may also face competition from other products seeking approval in conjunction with gemcitabine and Abraxane including FOLFRINOX, a combination chemotherapy regimen of folic acid, 5-fluouracil, oxaliplatin and irinotecan, Rafael Pharma's defactinib/CPI-613, and Merrimack's istiratumab.

Duchenne Muscular Dystrophy

If approved and launched commercially to treat DMD, pamrevlumab is expected to face competition from drugs that have been approved in major markets such as the U.S., European Union, and Japan.

On September 19, 2016, the FDA approved Sarepta Therapeutics Inc.'s ("Sarepta") Exondys 51™ (eteplirsen). Exondys 51 is approved to treat patients who have a mutation of the dystrophin gene amenable to exon 51 skipping, representing approximately 13% of patients with DMD. In Europe, Sarepta received a negative opinion for its marketing application for eteplirsen from the EMA in September 2018. Sarepta has reported a full year Exondys 51 revenue of $380 million in 2019. Sarepta's Vyondys 53™ (golodirsen) was approved by the FDA in December 2019 for patients with a confirmed genetic mutation that is amenable to exon 53 skipping, which accounts for approximately 8% of the DMD population. Sarepta's Amondys 45™ (casimersen) was approved by the FDA in February 2021 for patients with a confirmed genetic mutation that is amenable to exon 45 skipping, which accounts for approximately 8% of the DMD population.

PTC Therapeutics' product Translarna ™ received a conditional approval in Europe in 2014, which was renewed in November 2016 with a request for a new randomized placebo-controlled 18-month study by the Committee for Medicinal Products for Human Use of the EMA; however, the FDA informed the sponsor in a complete response letter in October 2017, as well as in its response to PTC Therapeutics' appeal, that the FDA is unable to approve the application in its current form. While Translarna ™ targets a different set of DMD patients from those targeted by Sarepta's Exondys 51®, it is also limited to a subset of patients who carry a specific mutation. Conversely, pamrevlumab is intended to treat DMD patients without limitation to type of mutation.

Pamrevlumab may also face competition from other drugs currently in clinical development in patient recruiting and enrollment in clinical trials, and, if approved, in commercialization. Examples of those compounds currently under clinical development are the drug candidates from Catabasis Pharmaceuticals, Santhera Pharmaceuticals, and Sarepta.

MANUFACTURE AND SUPPLY

We have historically and in the future plan to continue to enter into contractual arrangements with qualified third-party manufacturers to manufacture and package our products and product candidates. We believe that this manufacturing strategy enables us to more efficiently direct financial resources to the research, development and commercialization of product candidates rather than diverting resources to establishing a significant internal manufacturing infrastructure, unless there is additional strategic value for establishing manufacturing capabilities, such as in China. As our product candidates proceed through development, we explore or enter into longer term commercial supply agreements with key suppliers and manufacturers in order to meet the ongoing and planned clinical and commercial supply needs for ourselves and our partners. Our timing of entry into these agreements is based on the current development and commercialization plans.

Roxadustat

Roxadustat is a small-molecule drug manufactured from generally available commercial starting materials and chemical technologies and multi-purpose equipment available from many third party contract manufacturers. We have entered into commercial supply arrangements with Shanghai SynTheAll Pharmaceutical Co., Ltd. ("WuXi STA") and Catalent, Inc. ("Catalent") as our primary manufacturers of roxadustat drug substance (also known as active pharmaceutical ingredient or "API") and roxadustat drug product, respectively. WuXi STA is located in China and currently supplies our API globally except for China, for which it manufactures an intermediate to be further manufactured by FibroGen Beijing. WuXi STA has passed inspections by several regulatory agencies, including the FDA and NMPA, and is Current Good Manufacturing Practice ("cGMP") compliant. Catalent is located in the U.S. and supplies our drug product tablets globally except for Japan, where they are manufactured by Astellas, and China, where they are manufactured by FibroGen Beijing. Catalent has passed several regulatory inspections, including by the FDA, and manufactures commercial products for other clients.

In China, our Beijing facility received the Good Manufacturing Practice ("GMP") license for API and drug product. We are manufacturing drug product at our FibroGen Beijing manufacturing facility for commercial supply, but we are not currently manufacturing API at this facility. We are manufacturing API at our Cangzhou manufacturing facility, which has been fully qualified and licensed. We may also qualify a third party manufacturer to produce commercial API under the Marketing Authorization Holder System program.

Irix Pharmaceuticals, Inc.

In July 2002, we and IRIX Pharmaceuticals, Inc. ("IRIX"), a third party manufacturer, entered into a Letter of Agreement for IRIX Pharmaceuticals Single Source Manufacturing Agreement (the "Letter of Agreement"), in connection with a contract manufacturing arrangement for clinical supplies of HIF-PH inhibitors, including roxadustat. The Letter of Agreement contained a service agreement that included terms and schedule for the delivery of clinical materials and also included a term sheet for a single source agreement for the cGMP manufacture of HIF-PH inhibitors, including roxadustat. Specifically, pursuant to the Letter of Agreement, we and IRIX agreed to negotiate a single source manufacturing agreement that included a first right to negotiate a manufacturing contract for HIF-PH inhibitors, including roxadustat, provided that IRIX is able to match any third party bids within 5%, and the exclusive right to manufacture extends for five years after approval of an NDA. Any agreement would provide that no minimum amounts would be specified until appropriate by forecast, that we and our commercialization partner would have the rights to contract with independent third parties that exceed IRIX's internal capabilities or in the event that we or our commercialization partner determines for reasons of continuity and security that such a need exists, provided that IRIX would supply a majority of the product if it is able to meet the requirements and the schedule required by us and our partner. Subsequent to the Letter of Agreement, IRIX and we have entered into several additional service agreements. IRIX has requested in writing that we honor the Letter of Agreement with respect to the single source manufacturing agreement. To date, we have offered to IRIX opportunities to bid for the manufacture of HIF-PH inhibitors, including roxadustat. In 2015, Patheon Pharmaceuticals Inc., a business unit of DPx Holdings B.V., acquired IRIX, and in 2017 ThermoFisher Scientific Inc. acquired Patheon Pharmaceuticals Inc.

Pamrevlumab

To date, pamrevlumab has been manufactured using specialized biopharmaceutical process techniques under a clinical supply agreement with a qualified third party contract manufacturer, Boehringer Ingelheim. We have entered into a clinical and commercial supply agreement for the manufacture of pamrevlumab with Samsung Biologics Co., Ltd., which has passed several regulatory inspections, including by the FDA, and manufactures commercial products for other clients.

GOVERNMENT REGULATION

Our business activities and operations, including the clinical testing, manufacturing, labeling, storage, distribution, record keeping, advertising, promotion, import, export and marketing of our product candidates, among other things, are subject to extensive regulation by governmental authorities in the U.S., China, and other countries. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations, including in Europe and China, requires the expenditure of substantial time and financial resources. Compliance with environmental laws, rules, and regulations has not had, and is not expected to have, a material effect on our capital expenditures, results of operations, or competitive position, and we do not currently anticipate material capital expenditures for environmental control facilities.

Failure to comply with the applicable requirements at any time during the product development process, approval process or after approval may subject an applicant and/or sponsor to a variety of administrative or judicial sanctions, including refusal by the applicable regulatory authority to approve pending applications, withdrawal of an approval, imposition of a clinical hold, issuance of warning letters and other types of letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, restitution, disgorgement of profits, or civil or criminal investigations and penalties brought by FDA and the Department of Justice, or other governmental entities.

We cannot predict with certainty whether future costs of compliance with government regulations, including any changes thereto or reinterpretations thereof, will have a material impact on capital expenditures, earnings or the company's competitive position. Refer to the section of this Annual Report captioned "*Item 1A. Risk Factors*" for a discussion of these potential impacts.

U.S. Product Approval Process

In the U.S., the FDA regulates drugs and biological products, or biologics, under the Public Health Service Act, as well as the FDCA, which is the primary law for regulation of drug products. Both drugs and biologics are subject to the regulations and guidance implementing these laws. Pharmaceutical products are also subject to regulation by other governmental agencies, such as the Federal Trade Commission, the Office of Inspector General of the U.S. Department of Health and Human Services, the Consumer Product Safety Commission and the Environmental Protection Agency. The clinical testing, manufacturing, labeling, storage, distribution, record keeping, advertising, promotion, import, export and marketing, among other things, of our product candidates are subject to extensive regulation by governmental authorities in the U.S. and other countries. The steps required before a drug or biologic may be approved for marketing in the U.S. generally include:

- Preclinical laboratory tests and animal tests conducted under Good Laboratory Practices.
- The submission to the FDA of an IND for human clinical testing, which must become effective before each human clinical trial commence.
- Adequate and well-controlled human clinical trials to establish the safety and efficacy of the product and conducted in accordance with good clinical practices ("GCP").
- The submission to the FDA of an NDA, in the case of a small molecule drug product, or a BLA, in the case of a biologic product.
- FDA acceptance, review and approval of the NDA or BLA, as applicable.
- Satisfactory completion of an FDA inspection of the manufacturing facilities at which the product is made to assess compliance with cGMPs.

The testing and approval process requires substantial time, effort and financial resources, and the receipt and timing of any approval is uncertain. The FDA may suspend clinical trials at any time on various grounds, including a finding that the subjects or patients are being exposed to a potentially unacceptable health risk.

Preclinical studies include laboratory evaluations of the product candidate, as well as animal studies to assess the potential safety and efficacy of the product candidate. Preclinical studies must be conducted in compliance with FDA regulations regarding GLPs. The results of the preclinical studies, together with manufacturing information and analytical data, are submitted to the FDA as part of the IND, which includes the results of preclinical testing and a protocol detailing, among other things, the objectives of the clinical trial, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated if the first phase or phases of the clinical trial lends themselves to an efficacy determination. The IND will become effective automatically 30 days after receipt by the FDA, unless the FDA raises concerns or questions about the conduct of the trials as outlined in the IND prior to that time. In this case, the IND sponsor and the FDA must resolve any outstanding concerns before clinical trials can proceed. The IND must become effective before clinical trials may be commenced.

Clinical trials involve the administration of the product candidates to healthy volunteers, or subjects, or patients with the disease to be treated under the supervision of a qualified principal investigator. Clinical trials must be conducted under the supervision of one or more qualified principal investigators in accordance with GCPs and in accordance with protocols detailing the objectives of the applicable phase of the trial, dosing procedures, research subject selection and exclusion criteria and the safety and effectiveness criteria to be evaluated. Progress reports detailing the status of clinical trials must be submitted to the FDA annually. Sponsors must also timely report to the FDA serious and unexpected adverse events, any clinically important increase in the rate of a serious suspected adverse event over that listed in the protocol or investigator's brochure, or any findings from other studies or tests that suggest a significant risk in humans exposed to the product candidate. Further, the protocol for each clinical trial must be reviewed and approved by an independent institutional review board ("IRB"), either centrally or individually at each institution at which the clinical trial will be conducted. The IRB will consider, among other things, ethical factors, and the safety of human subjects and the possible liability of the institution.

Clinical trials are typically conducted in three sequential phases prior to approval, but the phases may overlap and different trials may be initiated with the same drug candidate within the same phase of development in similar or different patient populations. These phases generally include the following:

Phase 1. Phase 1 clinical trials represent the initial introduction of a product candidate into human subjects, frequently healthy volunteers. In Phase 1, the product candidate is usually tested for pharmacodynamic and pharmacokinetic properties such as safety, including adverse effects, dosage tolerance, absorption, distribution, metabolism and excretion.

Phase 2. Phase 2 clinical trials usually involve studies in a limited patient population to (1) evaluate the efficacy of the product candidate for specific indications, (2) determine dosage tolerance and optimal dosage and (3) identify possible adverse effects and safety risks.

Phase 3. If a product candidate is found to be potentially effective and to have an acceptable safety profile in Phase 2 studies, the clinical trial program will be expanded to Phase 3 clinical trials to further evaluate clinical efficacy, optimal dosage and safety within an expanded patient population at geographically dispersed clinical study sites.

Phase 4. Phase 4 clinical trials are conducted after approval to gain additional experience from the treatment of patients in the intended therapeutic indication and to document a clinical benefit in the case of drugs approved under accelerated approval regulations, or when otherwise requested by the FDA in the form of post-market requirements or commitments. Failure to promptly conduct any required Phase 4 clinical trials could result in withdrawal of approval.

The results of preclinical studies and clinical trials, together with detailed information on the manufacture, composition and quality of the product candidate, are submitted to the FDA in the form of an NDA (for a drug) or BLA (for a biologic), requesting approval to market the product. The application must be accompanied by a significant user fee payment. The FDA has substantial discretion in the approval process and may refuse to accept any application or decide that the data is insufficient for approval and require additional preclinical, clinical or other studies.

Review of Application

Once the NDA or BLA submission has been accepted for filing, which occurs, if at all, 60 days after submission, the FDA informs the applicant of the specific date by which the FDA intends to complete its review. This is typically 12 months from the date of submission. The review process is often extended by FDA requests for additional information or clarification. The FDA reviews NDAs and BLAs to determine, among other things, whether the proposed product is safe and effective for its intended use, and whether the product is being manufactured in accordance with cGMP to assure and preserve the product's identity, strength, quality and purity. Before approving an NDA or BLA, the FDA may inspect the facilities at which the product is manufactured and will not approve the product unless the manufacturing facility complies with cGMPs and will also inspect clinical trial sites for integrity of data supporting safety and efficacy. During the approval process, the FDA also will determine whether a REMS, is necessary to assure the safe use of the product. If the FDA concludes a REMS is needed, the sponsor of the application must submit a proposed REMS; the FDA will not approve the application without an approved REMS, if required. A REMS can substantially increase the costs of obtaining approval. The FDA may also convene an advisory committee of external experts to provide input on certain review issues relating to risk, benefit and interpretation of clinical trial data. The FDA may delay approval of an NDA if applicable regulatory criteria are not satisfied and/or the FDA requires additional testing or information. The FDA may require post-marketing testing and surveillance to monitor safety or efficacy of a product. FDA will issue either an approval of the NDA or BLA or a complete response letter detailing the deficiencies and information required in order for reconsideration of the application.

Pediatric Exclusivity and Pediatric Use

Under the Best Pharmaceuticals for Children Act, certain drugs or biologics may obtain an additional six months of exclusivity in an indication, if the sponsor submits information requested in writing by the FDA ("Written Request"), relating to the use of the active moiety of the drug or biologic in children. The FDA may not issue a Written Request for studies on unapproved or approved indications or where it determines that information relating to the use of a drug or biologic in a pediatric population, or part of the pediatric population, may not produce health benefits in that population.

We have not received a Written Request for such pediatric studies with respect to our product candidates, although we may ask the FDA to issue a Written Request for studies in the future. To receive the six-month pediatric market exclusivity, we would have to receive a Written Request from the FDA, conduct the requested studies in accordance with a written agreement with the FDA or, if there is no written agreement, in accordance with commonly accepted scientific principles, and submit reports of the studies. A Written Request may include studies for indications that are not currently in the labeling if the FDA determines that such information will benefit the public health. The FDA will accept the reports upon its determination that the studies were conducted in accordance with and are responsive to the original Written Request, agreement, or commonly accepted scientific principles, as appropriate, and that the reports comply with the FDA's filing requirements.

In addition, the Pediatric Research Equity Act ("PREA") requires a sponsor to conduct pediatric studies for most drugs and biologicals, for a new active ingredient, new indication, new dosage form, new dosing regimen or new route of administration. Under PREA, original NDAs, BLAs and supplements thereto must contain a pediatric assessment unless the sponsor has received a deferral or waiver. The required assessment must include the evaluation of the safety and effectiveness of the product for the claimed indications in all relevant pediatric subpopulations and support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The FDA, on its own initiative or at the request of the sponsor, may request a deferral of pediatric studies for some or all of the pediatric subpopulations. A deferral may be granted by FDA if they believe that additional safety or effectiveness data in the adult population needs to be collected before the pediatric studies begin. After April 2013, the FDA must send a non-compliance letter to any sponsor that fails to submit the required assessment, keep a deferral current or fails to submit a request for approval of a pediatric formulation.

Post-Approval Requirements

Even after approval, drugs and biologics manufactured or distributed pursuant to FDA approvals are subject to continuous regulation by the FDA, including, among other things, requirements relating to recordkeeping, periodic reporting, product distribution, advertising and promotion and reporting of adverse experiences with the product. After approval, most changes to the approved product, such as adding new indications or other labeling claims are subject to prior FDA review and approval. There also are continuing, annual user fee requirements for any marketed products and the establishments at which such products are manufactured, as well as new application fees for supplemental applications with clinical data.

The FDA may impose a number of post-approval requirements as a condition of approval of an NDA or BLA. For example, the FDA may require post-marketing testing, including Phase 4 clinical trials, and surveillance to further assess and monitor the product's safety and effectiveness after commercialization.

In addition, entities involved in the manufacture and distribution of approved drugs and biologics are required to register their establishments with the FDA and state agencies, and are subject to periodic unannounced inspections by the FDA and these state agencies for compliance with cGMP requirements. Changes to the manufacturing process are strictly regulated and often require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting and documentation requirements upon the sponsor and any third-party manufacturers that the sponsor may decide to use. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain cGMP compliance.

Once an approval is granted, the FDA may withdraw the approval if compliance with regulatory requirements and standards is not maintained or if problems occur after the product reaches the market. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with manufacturing processes, or failure to comply with regulatory requirements, may also result in revisions to the approved labeling to add new safety information; imposition of post-market studies or clinical trials to assess new safety risks; or imposition of distribution or other restrictions under a REMS program. Other potential consequences include, among other things:

- Restrictions on the marketing or manufacturing of the product, complete withdrawal of the product from the market or product recalls.
- Fines, warning letters or holds on post-approval clinical trials.
- Refusal of the FDA to approve pending NDAs or BLAs or supplements to approved NDAs or BLAs, or suspension or revocation of product license approvals.
- Product seizure or detention, or refusal to permit the import or export of products.
- Injunctions or the imposition of civil or criminal penalties.

The FDA strictly regulates marketing, labeling, advertising and promotion of products that are placed on the market. Drugs may be promoted only for the approved indications and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant liability.

Prescription Drug Marketing Act

The distribution of pharmaceutical products is subject to the Prescription Drug Marketing Act (“PDMA”), which regulates the distribution of drugs and drug samples at the federal level and sets minimum standards for the registration and regulation of drug distributors at the state level. Under the PDMA and state law, states require the registration of manufacturers and distributors who provide pharmaceuticals in that state, including in certain states manufacturers and distributors who ship pharmaceuticals into the state even if such manufacturers or distributors have no place of business within the state. The PDMA and state laws impose requirements and limitations upon drug sampling to ensure accountability in the distribution of samples. The PDMA sets forth civil and criminal penalties for violations of these and other provisions.

Federal and State Fraud and Abuse and Data Privacy and Security and Transparency Laws and Regulations

In addition to FDA restrictions on marketing of pharmaceutical products, federal and state healthcare laws restrict certain business practices in the biopharmaceutical industry. These laws include, but are not limited to, anti-kickback, false claims, data privacy and security, and transparency statutes and regulations.

The federal Anti-Kickback Statute prohibits, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration, directly or indirectly, to induce, or in return for, purchasing, leasing, ordering or arranging for the purchase, lease or order of any good, facility, item or service reimbursable under Medicare, Medicaid or other federal healthcare programs. The term "remuneration" has been broadly interpreted to include anything of value, including for example, gifts, discounts, the furnishing of supplies or equipment, credit arrangements, payments of cash, waivers of payment, ownership interests and providing anything at less than its fair market value. The Anti-Kickback Statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on one hand and prescribers, purchasers and formulary managers on the other. Although there are a number of statutory exemptions and regulatory safe harbors protecting certain common activities from prosecution, the exemptions and safe harbors are drawn narrowly, and our practices may not in all cases meet all of the criteria for a statutory exception or safe harbor protection. Practices that involve remuneration that may be alleged to be intended to induce prescribing, purchases or recommendations may be subject to scrutiny if they do not qualify for an exception or safe harbor. Failure to meet all of the requirements of a particular applicable statutory exception or regulatory safe harbor does not make the conduct per se illegal under the Anti-Kickback Statute. Instead, the legality of the arrangement will be evaluated on a case-by-case basis based on a cumulative review of all of its facts and circumstances. Several courts have interpreted the statute's intent requirement to mean that if any one purpose of an arrangement involving remuneration is to induce referrals of federal healthcare covered business, the statute has been violated. The intent standard under the Anti-Kickback Statute was amended by the Patient Protection and Affordable Care Act as amended by the Health Care and Education Reconciliation Act of 2010 (collectively "PPACA"), to a stricter intent standard such that a person or entity no longer needs to have actual knowledge of this statute or the specific intent to violate it in order to have committed a violation. In addition, PPACA codified case law that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act (discussed below). Further, civil monetary penalties statute imposes penalties against any person or entity who, among other things, is determined to have presented or caused to be presented a claim to a federal health program that the person knows or should know is for an item or service that was not provided as claimed or is false or fraudulent.

The federal false claims laws prohibit, among other things, any person or entity from knowingly presenting, or causing to be presented, a false or fraudulent claim for payment or approval to the federal government or knowingly making, using or causing to be made or used a false record or statement material to a false or fraudulent claim to the federal government. As a result of a modification made by the Fraud Enforcement and Recovery Act of 2009, a claim includes "any request or demand" for money or property presented to the U.S. government. Recently, several pharmaceutical and other healthcare companies have been prosecuted under these laws for, among other things, allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. Other companies have been prosecuted for causing false claims to be submitted because of the companies' marketing of the product for unapproved, and thus non-reimbursable, uses. The federal Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), created new federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, including private third-party payors and knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of, or payment for, healthcare benefits, items or services.

In addition, we may be subject to data privacy and security regulation by both the federal government and the states in which we conduct our business. HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act ("HITECH"), and its implementing regulations, imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information. Among other things, HITECH makes HIPAA's privacy and security standards directly applicable to business associates — independent contractors or agents of covered entities that receive or obtain protected health information in connection with providing a service on behalf of a covered entity. HITECH also created four new tiers of civil monetary penalties, amended HIPAA to make civil and criminal penalties directly applicable to business associates, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorney's fees and costs associated with pursuing federal civil actions. In addition, state laws govern the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

Additionally, the federal Physician Payments Sunshine Act within the PPACA, and its implementing regulations, require that certain manufacturers of drugs, devices, biologicals and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report information related to certain payments or other transfers of value made or distributed to physicians and teaching hospitals, or to entities or individuals at the request of, or designated on behalf of, the physicians and teaching hospitals and to report annually certain ownership and investment interests held by physicians and their immediate family members.

Also, many states have similar healthcare statutes or regulations that apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payor. Some states require the posting of information relating to clinical studies. In addition, California requires pharmaceutical companies to implement a comprehensive compliance program that includes a limit on expenditures for, or payments to, individual medical or health professionals. If our operations are found to be in violation of any of the health regulatory laws described above or any other laws that apply to us, we may be subject to penalties, including potentially significant criminal, civil and/or administrative penalties, damages, fines, disgorgement, individual imprisonment, exclusion of products from reimbursement under government programs, contractual damages, reputational harm, administrative burdens, diminished profits and future earnings and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations. To the extent that any of our products will be sold in a foreign country, we may be subject to similar foreign laws and regulations, which may include, for instance, applicable post-marketing requirements, including safety surveillance, anti-fraud and abuse laws and implementation of corporate compliance programs and reporting of payments or transfers of value to healthcare professionals.

Pharmaceutical Coverage, Pricing and Reimbursement

In both domestic and foreign markets, our sales of any approved products will depend in part on the availability of coverage and adequate reimbursement from third-party payors. Third-party payors include government health administrative authorities, managed care providers, private health insurers and other organizations. Patients who are prescribed treatments for their conditions and providers performing the prescribed services generally rely on third-party payors to reimburse all or part of the associated healthcare costs. Patients are unlikely to use our products unless coverage is provided and reimbursement is adequate to cover a significant portion of the cost of our products. Sales of our products will therefore depend substantially, both domestically and abroad, on the extent to which the costs of our products will be paid by third-party payors. These third-party payors are increasingly focused on containing healthcare costs by challenging the price and examining the cost-effectiveness of medical products and services. In addition, significant uncertainty exists as to the coverage and reimbursement status of newly approved healthcare product candidates. The market for our products and product candidates for which we may receive regulatory approval will depend significantly on access to third-party payors' drug formularies, or lists of medications for which third-party payors provide coverage and reimbursement. The industry competition to be included in such formularies often leads to downward pricing pressures on pharmaceutical companies. Also, third-party payors may refuse to include a particular branded drug in their formularies or otherwise restrict patient access to a branded drug when a less costly generic equivalent or other alternative is available.

Because each third-party payor individually approves coverage and reimbursement levels, obtaining coverage and adequate reimbursement is a time-consuming, costly and sometimes unpredictable process. We may be required to provide scientific and clinical support for the use of any product to each third-party payor separately with no assurance that approval would be obtained, and we may need to conduct expensive pharmacoeconomic studies in order to demonstrate the cost-effectiveness of our products. This process could delay the market acceptance of any product and could have a negative effect on our future revenues and operating results. We cannot be certain that our products and our product candidates will be considered cost-effective. Because coverage and reimbursement determinations are made on a payor-by-payor basis, obtaining acceptable coverage and reimbursement from one payor does not guarantee that we will obtain similar acceptable coverage or reimbursement from another payor. If we are unable to obtain coverage of, and adequate reimbursement and payment levels for, our product candidates from third-party payors, physicians may limit how much or under what circumstances they will prescribe or administer them and patients may decline to purchase them. This in turn could affect our ability to successfully commercialize our products and impact our profitability, results of operations, financial condition and future success.

In addition, in many foreign countries, particularly the countries of the European Union and China, the pricing of prescription drugs is subject to government control. In some non-U.S. jurisdictions, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing vary widely from country to country. For example, the European Union provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of a company placing the medicinal product on the market. We may face competition for our product candidates from lower-priced products in foreign countries that have placed price controls on pharmaceutical products. In addition, there may be importation of foreign products that compete with our own products, which could negatively impact our profitability.

Healthcare Reform

In the U.S. and foreign jurisdictions, there have been, and we expect there will continue to be, a number of legislative and regulatory changes to the healthcare system that could affect our future results of operations as we begin to directly commercialize our products. In particular, there have been and continue to be a number of initiatives at the U.S. federal and state level that seek to reduce healthcare costs. If a drug product is reimbursed by Medicare or Medicaid, pricing and rebate programs must comply with, as applicable, the Medicaid rebate requirements of the Omnibus Budget Reconciliation Act of 1990, as amended, and the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 ("MMA"). The MMA imposed new requirements for the distribution and pricing of prescription drugs for Medicare beneficiaries. Under Part D, Medicare beneficiaries may enroll in prescription drug plans offered by private entities that provide coverage of outpatient prescription drugs. Part D plans include both stand-alone prescription drug benefit plans and prescription drug coverage as a supplement to Medicare Advantage plans. Unlike Medicare Part A and B, Part D coverage is not standardized. Part D prescription drug plan sponsors are not required to pay for all covered Part D drugs, and each drug plan can develop its own drug formulary that identifies which drugs it will cover and at what tier or level. However, Part D prescription drug formularies must include drugs within each therapeutic category and class of covered Part D drugs, though not necessarily all the drugs in each category or class. Any formulary used by a Part D prescription drug plan must be developed and reviewed by a pharmacy and therapeutic committee. Government payment for some of the costs of prescription drugs may increase demand for our products for which we receive marketing approval. However, any negotiated prices for our future products covered by a Part D prescription drug plan will likely be lower than the prices we might otherwise obtain from non-governmental payors. Moreover, while the MMA applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own payment rates. Any reduction in payment that results from Medicare Part D may result in a similar reduction in payments from non-governmental payors.

Moreover, on November 27, 2013, the federal Drug Supply Chain Security Act was signed into law, which imposes new obligations on manufacturers of pharmaceutical products, among others, related to product tracking and tracing. Among the requirements of this new federal legislation, manufacturers will be required to provide certain information regarding the drug product to individuals and entities to which product ownership is transferred, label drug product with a product identifier, and keep certain records regarding the drug product. Further, under this new legislation, manufacturers will have drug product investigation, quarantine, disposition, and notification responsibilities related to counterfeit, diverted, stolen, and intentionally adulterated products, as well as products that are the subject of fraudulent transactions or which are otherwise unfit for distribution such that they would be reasonably likely to result in serious health consequences or death.

Furthermore, political, economic and regulatory influences are subjecting the healthcare industry in the U.S. to fundamental change. Initiatives to reduce the federal budget and debt and to reform healthcare coverage are increasing cost-containment efforts. We anticipate that Congress, state legislatures and the private sector will continue to review and assess alternative healthcare benefits, controls on healthcare spending through limitations on the growth of private health insurance premiums and Medicare and Medicaid spending, the creation of large insurance purchasing groups, price controls on pharmaceuticals and other fundamental changes to the healthcare delivery system. Any proposed or actual changes could limit or eliminate our spending on development projects and affect our ultimate profitability.

Under the Medicare Improvements for Patients and Providers Act ("MIPPA"), a basic case-mix adjusted composite, or bundled, payment system commenced in January 2011 and transitioned fully by January 2014 to a single reimbursement rate for drugs and all services furnished by renal dialysis centers for Medicare beneficiaries with end-stage renal disease. Specifically, under MIPPA the End-Stage Renal Disease Prospective Payment System (the "ESRD PPS") bundle now covers drugs, services, lab tests and supplies under a single treatment base rate for reimbursement by the CMS based on the average cost per treatment, including the cost of ESAs and IV iron doses, typically without adjustment for usage. It is unknown whether roxadustat, if approved in the U.S., will be included in the payment bundle or the timing of inclusion. Under MIPPA, agents that have no IV equivalent in the bundle are currently expected to be excluded from the bundle until 2025. If roxadustat were included in the bundle, it may reduce the price that could be charged for roxadustat, and therefore potentially limit our profitability. Based on roxadustat's differentiated mechanism of action and therapeutic effects, and discussions with our collaboration partner, we currently believe that roxadustat might not initially be included in the bundle and would instead be eligible for a Transitional Drug Add-on Payment Adjustment ("TDAPA") for a 24-month period. At the 24-month mark, CMS would determine if the TDAPA period should be extended for roxadustat or ended. When the TDAPA period ends, CMS will determine if roxadustat should be included in the bundle and, if so, what changes to the ESRD PPS reimbursement should be made. If roxadustat is included in the ESRD PPS bundle, it may have an impact on roxadustat pricing within Dialysis Organizations. If roxadustat is not included in the bundle after the TDAPA period, and would therefore be reimbursed outside of the bundle, it may potentially limit further market penetration of roxadustat.

In March 2010, PPACA was signed into law. PPACA has the potential to substantially change the way healthcare is financed by both governmental and private insurers. Among other cost containment measures, PPACA established: an annual, nondeductible fee on any entity that manufactures or imports certain branded prescription drugs and biologic agents; revised the methodology by which rebates owed by manufacturers to the state and federal government for covered outpatient drugs under the Medicaid Drug Rebate Program are calculated; increased the minimum Medicaid rebates owed by most manufacturers under the Medicaid Drug Rebate Program; and extended the Medicaid Drug Rebate program to utilization of prescriptions of individuals enrolled in Medicaid managed care organizations. There remain judicial and Congressional challenges to certain aspects of the PPACA. The U.S. Supreme Court is currently reviewing the constitutionality of the PPACA, but it is unknown when a decision will be reached. It is unclear how the U.S. Supreme Court ruling, other such litigation, and the healthcare reform measures of the Biden administration will impact the PPACA. In the future, there may continue to be additional proposals relating to the reform of the U.S. healthcare system, some of which could further limit the prices we are able to charge for our products, or the amounts of reimbursement available for our products. If future legislation were to impose direct governmental price controls and access restrictions, it could have a significant adverse impact on our business. Managed care organizations, as well as Medicaid and other government agencies, continue to seek price discounts.

Further, in the U.S. there has been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products, which has resulted in several Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under government payor programs, and review the relationship between pricing and manufacturer patient programs. At the federal level, the Trump administration used several means to propose or implement drug pricing reform, including through federal budget proposals, executive orders and policy initiatives. For example, on July 24, 2020 and September 13, 2020, the Trump administration announced several executive orders related to prescription drug pricing that attempt to implement several of the administration's proposals. The FDA also released a final rule, effective November 30, 2020, implementing a portion of the importation executive order providing guidance for states to build and submit importation plans for drugs from Canada. Further, on November 20, 2020, HHS finalized a regulation removing safe harbor protection for price reductions from pharmaceutical manufacturers to plan sponsors under Part D, either directly or through pharmacy benefit managers, unless the price reduction is required by law. The implementation of the rule has been delayed by the Biden administration from January 1, 2022 to January 1, 2023 in response to ongoing litigation. The rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a new safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers, the implementation of which have also been delayed pending review by the Biden administration until March 22, 2021. On November 20, 2020, CMS issued an interim final rule implementing President Trump's Most Favored Nation executive order, which would tie Medicare Part B payments for certain physician-administered drugs to the lowest price paid in other economically advanced countries, effective January 1, 2021. On December 28, 2020, the United States District Court in Northern California issued a nationwide preliminary injunction against implementation of the interim final rule. However, it is unclear whether the Biden administration will work to reverse these measures or pursue similar policy initiatives.

Some states have implemented, and other states are considering, price controls or patient access constraints under the Medicaid program, and some states are considering price-control regimes that would apply to broader segments of their populations that are not Medicaid-eligible. Due to the volatility in the current economic and market dynamics, we are unable to predict the impact of any unforeseen or unknown legislative, regulatory, payor or policy actions, which may include cost containment and healthcare reform measures. Such policy actions could have a material adverse impact on our profitability.

Approval Process and Other Regulation in China

The pharmaceutical industry in China is highly regulated. The primary regulatory authority is the NMPA, including its provincial and local branches. As a developer, manufacturer and supplier of drugs, we are subject to regulation and oversight by the NMPA and its provincial and local branches. The Drug Administration Law of China provides the basic legal framework for the administration of the production and sale of pharmaceuticals in China and covers the manufacturing, distributing, packaging, pricing and advertising of pharmaceutical products. Its implementing regulations set forth detailed rules with respect to the administration of pharmaceuticals in China. In addition, we are, and we will be, subject to other Chinese laws and regulations that are applicable to business operators, manufacturers and distributors in general.

Pharmaceutical Clinical Development

A new drug must be approved by the NMPA before it can be manufactured and marketed for sale. To obtain NMPA approval, the applicant must conduct clinical trials, which must be approved by the NMPA and are subject to the NMPA's supervision and inspection. There are four phases of clinical trials. Application for registration of new drugs requires completion of Phase 1, 2 and 3 of clinical trials, similar to the U.S. In addition, the NMPA may require the conduct of Phase 4 studies as a condition to approval.

Phase 4 studies are post-marketing studies to assess the therapeutic effectiveness of and adverse reactions to the new drug, including an evaluation of the benefits and risks, when used among the general population or specific groups, with findings used to inform adjustments to dosage, among other things.

NDA and Approval to Market

China requires approval of the NDA as well as the manufacturing facility before a drug can be marketed in China. Approval and oversight are performed at national and provincial levels of the NMPA, involve multiple agencies and consist of various stages of approval.

Under the applicable drug registration regulations, drug registration applications are divided into three different types, namely Domestic NDA, Domestic Generic Drug Application, and Imported Drug Application. Drugs fall into one of three categories, namely chemical medicine, biological product or traditional Chinese or natural medicine.

Our roxadustat NDA for treatment of CKD anemia was submitted by FibroGen Beijing as a domestic entity under the Domestic Class 1 designation, which refers to a new drug that has never been marketed in any country.

Our NDA package in China contained information similar to what is necessary for a U.S. NDA, including preclinical data, clinical data, technical data on API and drug product, and related stability data. We are currently performing a safety study of 2,000 patients who will be treated for 52 weeks as part of our post-approval commitment to the NMPA.

Shortly before NDA approval, FibroGen Beijing conducted a three-batch validation campaign, one of which was observed onsite by the NMPA. Following the successful completion of the validation campaign and associated inspection, FibroGen Beijing was granted a cGMP certification for the commercial production of roxadustat at our Beijing manufacturing facility. We are using our FibroGen Beijing manufacturing facility for commercial supply of drug product. Our Cangzhou manufacturing facility has been fully qualified and licensed for manufacture of roxadustat API for the China market, and we will continue to use this facility for commercial supply. We may also qualify a third party manufacturer to produce commercial API under the Marketing Authorization Holder System program.

Pricing, Reimbursement, Hospital Listing, and Tendering

Please see the discussion above in the section "*Roxadustat for the Treatment of Anemia in Chronic Kidney Disease in China*."

Foreign Regulation Outside of China

In order to market any product outside of the U.S., we would need to comply with numerous and varying regulatory requirements of other countries and jurisdictions regarding quality, safety and efficacy and governing, among other things, clinical trials, manufacturing, marketing authorization, commercial sales and distribution of our products. Whether or not we obtain FDA approval for a product, we would need to obtain the necessary approvals by the comparable foreign regulatory authorities before we can commence clinical trials or marketing of the product in foreign countries and jurisdictions. Although many of the issues discussed above with respect to the U.S. apply similarly in the context of other countries we are seeking approval in, including Europe and China, the approval process varies between countries and jurisdictions and can involve different amounts of product testing and additional administrative review periods. For example, in Europe and in China, a sponsor must submit a clinical trial application ("CTA"), much like an IND prior to the commencement of human clinical trials. A CTA must be submitted to each national health authority and an independent ethics committee.

For other countries outside of the European Union, such as China and the countries in Eastern Europe, Latin America or Asia, the requirements governing the conduct of clinical trials, product licensing, pricing, and reimbursement vary from country to country. The time required to obtain approval in other countries and jurisdictions might differ from or be longer than that required to obtain FDA approval. Regulatory approval in one country or jurisdiction does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one country or jurisdiction may negatively impact the regulatory approval process in other countries.

Regulatory Exclusivity for Approved Products

U.S. Patent Term Restoration

Depending upon the timing, duration, and specifics of the FDA approval of our product candidates, some of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Act. The Hatch-Waxman Act permits a patent restoration term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. The patent term restoration period is generally one-half the time between the effective date of an initial IND and the submission date of an NDA or BLA, plus the time between the submission date of the NDA or BLA and the approval of that product candidate application. Patent term restoration cannot, however, extend the remaining term of a patent beyond a total of 14 years from the product's approval date. In addition, only one patent applicable to an approved product is eligible for the extension and the application for the extension must be submitted prior to the expiration of the patent. The U.S. Patent and Trademark Office, in consultation with the FDA, reviews and approves applications for any patent term extension or restoration. In the future, we expect to apply for restoration of patent term for patents relating to each of our product candidates in order to add patent life beyond the current expiration date of such patents, depending on the length of the clinical trials and other factors involved in the filing of the relevant NDA or BLA.

Market exclusivity provisions under the FDCA can also delay the submission or the approval of certain applications of companies seeking to reference another company's NDA or BLA. The Hatch-Waxman Act provides a 5-year period of exclusivity to any approved NDA for a product containing a NCE never previously approved by FDA either alone or in combination with another active moiety. No application or abbreviated NDA directed to the same NCE may be submitted during the 5-year exclusivity period, except that such applications may be submitted after four years if they contain a certification of patent invalidity or non-infringement of the patents listed with the FDA by the innovator NDA.

Biologic Price Competition and Innovation Act

The Biologics Price Competition and Innovation Act of 2009 ("BPCIA"), established an abbreviated pathway for the approval of biosimilar and interchangeable biological products. The abbreviated regulatory approval pathway establishes legal authority for the FDA to review and approve biosimilar biologics, including the possible designation of a biosimilar as "interchangeable" based on similarity to an existing branded product. Under the BPCIA, an application for a biosimilar product cannot be approved by the FDA until 12 years after the original branded product was approved under a BLA. However, an application may be submitted after four years if it contains a certification of patent invalidity or non-infringement to one of the patents listed with the FDA by the innovator BLA holder. The BPCIA is complex and is only beginning to be interpreted and implemented by the FDA. As a result, its ultimate impact, implementation, and interpretation are subject to uncertainty.

Orphan Drug Act

Pamrevlumab has received orphan drug designation in IPF, LAPC, and DMD in the U.S. Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biological product intended to treat a rare disease or condition, which is a disease or condition that affects fewer than 200,000 individuals in the U.S., or if it affects more than 200,000 individuals in the U.S. there is no reasonable expectation that the cost of developing and making a drug product available in the U.S. for this type of disease or condition will be recovered from sales of the product. Orphan product designation must be requested before submitting an NDA. After the FDA grants orphan product designation, the identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA. Orphan product designation does not convey any advantage in or shorten the duration of the regulatory review and approval process.

If a product that has orphan designation subsequently receives the first FDA approval for the disease or condition for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA may not approve any other applications to market the same drug or biological product for the same indication for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan exclusivity. The designation of such drug also entitles a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages and user-fee waivers. Competitors, however, may receive approval of different products for the indication for which the orphan product has exclusivity or obtain approval for the same product but for a different indication for which the orphan product has exclusivity. Orphan product exclusivity also could block the approval of one of our products for seven years if a competitor obtains approval of the same drug or biological product as defined by the FDA or if our drug candidate is determined to be contained within the competitor's product for the same indication or disease. If a drug product designated as an orphan product receives marketing approval for an indication broader than what is designated, it may not be entitled to orphan product exclusivity in any indication.

The EMA has granted Orphan Medicinal Product Designation to pamrevlumab for the treatment of DMD. Orphan Medicinal Product Designation status in Europe has similar but not identical benefits in that jurisdiction.

Products receiving orphan designation in Europe can receive ten years of market exclusivity, during which time no similar medicinal product for the same indication may be placed on the market. The ten-year market exclusivity may be reduced to six years if, at the end of the fifth year, it is established that the product no longer meets the criteria for orphan designation; for example, if the product is sufficiently profitable not to justify maintenance of market exclusivity. Additionally, marketing authorization may be granted to a similar product for the same indication at any time if the second applicant can establish that its product, although similar, is safer, more effective or otherwise clinically superior; the initial applicant consents to a second orphan medicinal product application; or the initial applicant cannot supply enough orphan medicinal product. An orphan product can also obtain an additional two years of market exclusivity in Europe for pediatric studies. No extension to any supplementary protection certificate can be granted on the basis of pediatric studies for orphan indications.

Foreign Country Data Exclusivity

Europe also provides opportunities for additional market exclusivity. For example, in Europe, upon receiving marketing authorization, an NCE generally receives eight years of data exclusivity and an additional two years of market exclusivity. If granted, data exclusivity prevents regulatory authorities in Europe from referencing the innovator's data to assess a generic application. During the additional two-year period of market exclusivity, a generic marketing authorization can be submitted, and the innovator's data may be referenced, but no generic product can be marketed until the expiration of the market exclusivity.

In China, there is also an opportunity for data exclusivity for a period of six years for data included in an NDA applicable to a NCE. According to the Implementing Regulations of the PRC Drug Administration Law, the Chinese government protects undisclosed data from drug studies and prevents the approval of an application made by another company that uses the undisclosed data for the approved drug. In practice, the NMPA has not established an effective mechanism to enforce data exclusivity. The NMPA issued a draft regulation on regulatory data protection on April 25, 2018 for public comments but this draft regulation has yet to be finalized and implemented.

In addition, if an approved drug manufactured in China qualifies as an innovative drug or an improved new drug before December 1, 2019, such drugs will be eligible for a monitoring surveillance period for up to five years. During this post-marketing observation period, the NMPA will not accept marketing authorization applications filed by another company for the same product. Nor will the NMPA approve marketing authorization applications filed by another company to produce, change dosage form of or import the drug while the innovative or improved new drug is under observation for the purpose of protecting public health. The approved manufacturer is required to provide an annual report to the regulatory department of the province, autonomous region or municipality directly under the central government where it is located.

Each of the data exclusivity period and the observation period runs from the date of approval for production of the NCE or innovative or improved new drug, as the case may be.

INTELLECTUAL PROPERTY

Our success depends in part upon our ability to obtain and maintain patent and other intellectual property protection for our product candidates including compositions-of-matter, dosages, and formulations, manufacturing methods, and novel applications, uses and technological innovations related to our product candidates and core technologies. We also rely on trade secrets, know-how and continuing technological innovation to further develop and maintain our competitive position.

Our policy is to seek to protect our proprietary position by, among other methods, filing U.S. and foreign patent applications related to our proprietary technologies, inventions and any improvements that we consider important to the development and implementation of our business and strategy. Our ability to maintain and solidify our proprietary position for our products and technologies will depend, in part, on our success in obtaining and enforcing valid patent claims. Additionally, we may benefit from a variety of regulatory frameworks in the U.S., Europe, China, and other territories that provide periods of non-patent-based exclusivity for qualifying drug products. *Refer to "Government Regulation — Regulatory Exclusivity for Approved Products."*

We cannot ensure that patents will be granted with respect to any of our pending patent applications or with respect to any patent applications that may be filed by us in the future, nor can we ensure that any of our existing or subsequently granted patents will be useful in protecting our drug candidates, technological innovations, and processes. Additionally, any existing or subsequently granted patents may be challenged, invalidated, circumvented or infringed. We cannot guarantee that our intellectual property rights or proprietary position will be sufficient to permit us to take advantage of current market trends or otherwise to provide or protect competitive advantages. Furthermore, our competitors may be able to independently develop and commercialize similar products, or may be able to duplicate our technologies, business model, or strategy, without infringing our patents or otherwise using our intellectual property.

Our extensive worldwide patent portfolio includes multiple granted and pending patent applications relating to roxadustat and pamrevlumab. Currently granted patents relating to composition-of-matter for roxadustat and for pamrevlumab are expected, for each product candidate, to expire in 2024 or 2025, in each case exclusive of any patent term extension that may be available. U.S. and foreign patents relating to crystalline forms of roxadustat are expected to expire in 2033, exclusive of any extension. Additional patents and patent applications relating to manufacturing processes, formulations, and various therapeutic uses, including treatment of specific indications and improvement of clinical parameters, provide further protection for product candidates.

The protection afforded by any particular patent depends upon many factors, including the type of patent, scope of coverage encompassed by the granted claims, availability of extensions of patent term, availability of legal remedies in the particular territory in which the patent is granted, and validity and enforceability of the patent. Changes in either patent laws or in the interpretation of patent laws in the U.S. and other countries could diminish our ability to protect our inventions and to enforce our intellectual property rights. Accordingly, we cannot predict with certainty the enforceability of any granted patent claims or of any claims that may be granted from our patent applications.

The biotechnology and pharmaceutical industries are characterized by extensive litigation regarding patents and other intellectual property rights. Our ability to maintain and solidify our proprietary position for our products and core technologies will depend on our success in obtaining effective claims and enforcing those claims once granted. We have been in the past and are currently involved in various legal proceedings with respect to our patents and patent applications and may, as a result of our extensive portfolio, be involved in such proceedings in the future. Additionally, we may claim that a third party infringes our intellectual property or a third party may claim that we infringe its intellectual property. Such legal proceedings may be associated with significant expenses, damages, attorneys' fees, costs of proceedings and experts' fees, and management and employees may be required to spend significant time in connection with these actions.

Because of the extensive time required for clinical development and regulatory review of a product candidate we may develop, it is possible that any patent related to our product candidates may expire before any of our product candidates can be commercialized, or may remain in force for only a short period of time following commercialization, thereby reducing the advantage afforded by any such patent.

The patent positions for our most advanced programs are summarized below.

Roxadustat Patent Portfolio

Our roxadustat patent portfolio includes multiple granted U.S. patents offering protection for roxadustat, including protection for roxadustat composition-of-matter, for pharmaceutical compositions containing roxadustat, and for methods for treating anemia using roxadustat or its analogs. Exclusive of any patent term extension, the granted U.S. patents relating to the composition-of-matter of roxadustat are due to expire in 2024 or 2025, and granted foreign patents are due to expire in 2024. U.S. and foreign patents relating to crystalline forms of roxadustat are due to expire in 2033, and U.S. and foreign patents relating to photostable formulations of roxadustat are due to expire in 2034.

In 2020, oppositions were filed against our European Patent No. 2872488 (the "`488 Patent"), which claims a crystalline form of roxadustat, and our European Patent No. 3003284 (the "`284 Patent"), which claims photostable formulations of roxadustat. Final resolution of the opposition proceedings will take time and we cannot be assured that all or any claims will remain.

We believe that, if roxadustat is approved, a full five-year patent term extension under the Hatch-Waxman act will be available for a granted U.S. patent relating to roxadustat, which extension would expire in 2029 or 2030, depending on the patent extended. Refer to *"Government Regulation — Regulatory Exclusivity for Approved Products — U.S. Patent Term Restoration."*

We also hold various U.S. and foreign granted patents and pending patent applications directed to manufacturing processes, formulations, and methods for use of roxadustat.

Roxadustat China Patent Portfolio

Our roxadustat China patent portfolio includes granted patents covering roxadustat composition-of-matter, pharmaceutical compositions, methods of use, and manufacturing processes for roxadustat, as well as medicaments containing roxadustat for treating anemia and other conditions. Patents relating to roxadustat composition-of-matter and crystalline forms are due to expire in 2024 and 2033, respectively.

HIF Anemia-Related Technologies Patent Portfolio

We also have an extensive worldwide patent portfolio providing broad protection for proprietary technologies relating to the treatment of anemia and associated conditions. This portfolio currently contains granted patents and pending patent applications providing exclusivity for use of compounds falling within various and overlapping classes of HIF-PH inhibitors to achieve various therapeutic effects.

Various legal challenges have been initiated against this portfolio in several territories, including in Europe, the United Kingdom, Canada, and Japan. Regardless of the final outcome of any such actions, the potential narrowing or revocation of any of these patents does not affect our exclusivity for roxadustat or our freedom-to-operate with respect to use of roxadustat for the treatment of anemia in these or in other territories. A settlement has been reached in the litigation in Canada, resulting in the discontinuance of the action and leaving FibroGen's Canadian patents valid and enforceable.

In April 2020, in response to an invalidation action brought against certain of our United Kingdom patents by Akebia, the United Kingdom court handed down a decision invalidating United Kingdom designations of European Patent Nos. 1463823, 1633333, 2298301, 2322153, and 2322155. The United Kingdom designation to European Patent No. 2289531 was held to be valid in amended form, but not infringed by Akebia. We and our partner Astellas have filed an appeal of the decision in the United Kingdom Court of Appeal.

Pamrevlumab Patent Portfolio

Our pamrevlumab patent portfolio includes U.S. patents providing composition-of-matter protection for pamrevlumab and related antibodies, and for methods of using such in the treatment of fibroproliferative disorders, including IPF, liver fibrosis, and pancreatic cancer. Exclusive of any patent term extension, U.S. patents relating to pamrevlumab composition-of-matter are due to expire in 2024 or 2025. Corresponding foreign patents are due to expire, exclusive of any patent term extension, in 2024.

We believe that, if pamrevlumab is approved, a full five-year patent term extension under the Hatch-Waxman act will be available for a granted patent relating to pamrevlumab, which extension would expire in 2029 or 2030, depending on the patent extended.

We also hold additional granted U.S. and foreign patents and pending patent applications directed to the use of pamrevlumab to treat IPF, DMD, pancreatic cancer, liver fibrosis, and other disorders.

Trade Secrets and Know-How

In addition to patents, we rely upon proprietary trade secrets and know-how and continuing technological innovation to develop and maintain our competitive position. We seek to protect our proprietary information, in part, using confidentiality and other terms in agreements with our commercial partners, collaboration partners, consultants and employees. Such agreements are designed to protect our proprietary information, and may also grant us ownership of technologies that are developed through a relationship with a third party, such as through invention assignment provisions. Agreements may expire and we could lose the benefit of confidentiality, or our agreements may be breached and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors.

To the extent that our commercial partners, collaboration partners, employees and consultants use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions.

In-Licenses

Dana-Farber Cancer Institute

Effective March 2006, we entered into a license agreement with the Dana-Farber Cancer Institute (“DFCI”), under which we obtained an exclusive license to certain patent applications, patents and biological materials for all uses. The patent rights relate to inhibition of prolyl hydroxylation of the alpha subunit of hypoxia-inducible factor (HIFα), and include granted U.S. and foreign patents due to expire in 2022, exclusive of possible patent term extension. The licensed patents relate to use of HIF-PH inhibitors such as roxadustat.

Under the DFCI agreement, we are obligated to pay DFCI for past and ongoing patent prosecution expenses for the licensed patents. We are also obligated to pay DFCI annual maintenance fees, development milestone payments of up to $425,000, sales milestone payments of up to $3 million, and a sub-single-digit royalty on net sales by us or our affiliates or sublicensees of products that are covered by the licensed patents or incorporate the licensed biological materials. In addition, each sublicense we grant is subject to a one-time fixed amount payment to DFCI.

The agreement, along with any ongoing payment obligations, will continue in effect until the expiration of all licensed patents on a country-by-country basis, or, if there is no patent covering a licensed product incorporating the licensed biological materials, until 20 years after the effective date of the agreement. DFCI may terminate the agreement for our uncured material breach, if we cease to carry on our business and development activities with respect to all licensed products, if we fail to comply with our insurance obligations, or if we are convicted of a felony related to the manufacture, use, sale or importation of licensed products. We may terminate the agreement at any time on prior written notice to DFCI.

University of Miami

In May 1997, we entered into a license agreement with the University of Miami (the “University”), amended in July 1999, under which we obtained an exclusive, worldwide license to certain patent applications and patents for all uses. The current patent rights consist of a U.S. patent that relates to antibodies that specifically bind to biologically active fragments of CTGF, and is due to expire in 2022, exclusive of any patent term extension or adjustment that may be available. The licensed patent relates to pamrevlumab and related products.

Under the University agreement, we are obligated to pay for all ongoing patent expenses for the licensed patent. We were also obligated to pay an upfront licensing fee of $21,500, all of which has been paid, and development milestone payments of up to $450,000, of which $150,000 has been paid, as well as an additional milestone payment, in the low hundreds of thousands of dollars, for each new indication for which we obtain approval for a licensed product, and a single digit royalty, subject to certain reductions, on net sales of licensed products by us or our affiliates or sublicensees.

The agreement, along with any ongoing payment obligations, will continue in effect until the expiration of all licensed patents, on a country-by-country basis. The University may terminate the agreement for our uncured material breach or bankruptcy. We may terminate the agreement for the University's uncured material breach or at any time on prior written notice to the University.

Bristol-Myers Squibb Company (Medarex, Inc.)

Effective July 9, 1998 and as amended on June 30, 2001 and January 28, 2002, we entered into a research and commercialization agreement with Medarex, Inc. and its wholly-owned subsidiary GenPharm International, Inc. (now, collectively, part of Bristol-Myers Squibb Company ("Medarex")) to develop fully human monoclonal antibodies for potential anti-fibrotic therapies. Under the agreement, Medarex was responsible for using its proprietary immunizable transgenic mice ("HuMAb-Mouse technology") during a specified research period (the "Research Period"), to produce fully human antibodies against our proprietary antigen targets, including CTGF, for our exclusive use.

The agreement granted us an option to obtain an exclusive worldwide, royalty-bearing, commercial license to develop antibodies derived from Medarex's HuMAb-Mouse technology, for use in the development and commercialization of diagnostic and therapeutic products. In December 2002, we exercised that option with respect to twelve antibodies inclusive of the antibody from which pamrevlumab is derived. We granted back to Medarex an exclusive, worldwide, royalty-free, perpetual, irrevocable license, with the right to sublicense, to certain inventions created during the parties' research collaboration, with such license limited to use by Medarex outside the scope of our licensed antibodies.

As a result of the exercise of our option to obtain the commercial license, Medarex is precluded from:

(i) knowingly using any technology involving immunizable transgenic mice containing unrearranged human immunoglobulin genes with any of our antigen targets that were the subject of the agreement,

(ii) granting to a third party a commercial license that covers such antigen targets or those antibodies derived by Medarex during the Research Period, and

(iii) using any antibodies derived by Medarex during the Research Period, except as permitted under the agreement for our benefit or to prosecute patent applications in accordance with the agreement.

Medarex retained ownership of the patent rights relating to certain mice, mice materials, antibodies and hybridoma cell lines used by Medarex in connection with its activities under the agreement, and Medarex also owns certain claims in patents covering inventions that arise during the Research Period, which claims are directed to (i) compositions of matter (e.g., an antibody) except formulations of antibodies for therapeutic or diagnostic use, or (ii) methods of production. We own the patent rights to any inventions that arise during the Research Period that relate to antigens, as well as claims in patents covering inventions directed to (a) methods of use of an antibody, or (b) formulations of antibodies for therapeutic or diagnostic use. Upon exercise of our option to obtain the commercial license, we obtained the sole right but not obligation to control prosecution of patents relating solely to the licensed antibodies or products. Medarex has back-up patent prosecution rights in the event we decline to further prosecute or maintain such patents.

In addition to research support payments by us to Medarex during the Research Period, and an upfront commercial license fee in the form of 181,819 shares of FibroGen Series D Convertible Preferred Stock paid upon exercise of our option, we committed development-related milestone payments of up to $11 million per therapeutic product containing a licensed antibody, and we have paid a $1 million development-related milestone, in the form of 133,333 shares of FibroGen Series G Convertible Preferred Stock, and a cash payment of $2 million, for pamrevlumab to date. At our election, the remaining milestone payments may be paid in common stock of FibroGen, Inc., or cash.

With respect to our sales and sales by our affiliates, the agreement also requires us to pay Medarex low single-digit royalties for licensed therapeutic products and low double-digit royalties plus certain capped sales-based bonus royalties for licensed diagnostic products. With respect to sales of licensed products by a sublicensee, we may elect to pay the foregoing royalties based on our sublicensee's sales, or a percentage (in the high-teens) of all payments received by us from such sublicensee. We are also required to reimburse Medarex any pass-through royalties, if any, payable under Medarex's upstream license agreements with Medical Research Council and DNX. Royalties payable by us under the agreement are on a licensed product-by-licensed product and country-by-country basis and subject to reductions in specified circumstances, and royalties are payable for a period until either expiration of patents covering the applicable licensed product or a specified number of years following the first commercial sale of such product in the applicable country.

Unless earlier terminated, the agreement will continue in effect for as long as there are royalty payment obligations by us or our sublicensees. Either party may terminate the agreement for certain material breaches by the other party, or for bankruptcy, insolvency or similar circumstances. In addition, we may also terminate the agreement for convenience upon written notice.

Third Party Filings

Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are developing products. Because patent applications can take many years to issue, there may be currently pending applications, unknown to us, which may later result in granted patents that use of our product candidates or proprietary technologies may infringe.

If a third party claims that we infringe its intellectual property rights, we may face a number of issues, including but not limited to, litigation expenses, substantial damages, attorney fees, injunction, royalty payments, cross-licensing of our patents, redesign of our products, or processes and related fees and costs.

We may be exposed to, or threatened with, future litigation by third parties having patent or other intellectual property rights alleging that our products, product candidates, and/or proprietary technologies infringe their intellectual property rights. If one of these patents were to be found to cover our products, product candidates, proprietary technologies, or their uses, we could be required to pay damages and could be restricted from commercializing our products, product candidates or using our proprietary technologies unless we obtain a license to the patent. A license may not be available to us on acceptable terms, if at all. In addition, during litigation, the patent holder might obtain a preliminary injunction or other equitable right, which could prohibit us from making, using or selling our products, technologies, or methods.

HUMAN RESOURCES

We had a total of 599 employees at FibroGen as of January 31, 2021. None of our U.S. employees are represented by a labor union. The employees of FibroGen Beijing are represented by a labor union under the China Labor Union Law. None of our employees have entered into a collective agreement with us.

We are highly committed to building a diverse, committed, and impassioned team to deliver innovative therapies to patients facing serious unmet medical needs. In 2020 we developed and approved a new Corporate Vision Statement and Values through the participation and input of many staff across the organization. One of these core values is "Respect for People" which includes a strong commitment to build a culture of inclusiveness and equality and foster a culture of individual growth and an environment of continued learning.

In 2020, we conducted a company-wide employee engagement survey. We had an overall participation rate by employees of 86% with over 90% of respondents reporting that they felt engaged around our core values of excellence, respect for people, integrity, and empowerment. Both of these scores significantly exceed normative industry participation and engagement benchmarks.

The biotechnology industry is an extremely competitive labor market and recruiting and retaining employees is critical to the continued success of our business. We focus on recruiting, retaining, and developing employees from a diverse range of backgrounds to conduct our research, development, commercialization, and administrative activities.

We consistently review and evaluate our compensation and employee benefits practices to ensure that we recruit and retain a highly trained and diverse workforce. This includes comprehensive medical and income protection, such as life insurance and retirement savings programs. In addition to coaching and internal growth and promotion opportunities, we provide employees access to over 5,000 developmental classes and programs through a learning management system.

In 2020 we deployed a state-of-art, human capital management system that will allow us to significantly expand our capabilities to develop and assess our employees. This system will also allow us to build comprehensive development and succession plans at all levels in the organization to ensure that we have a strong pipeline of highly trained employees. We also invested in health and safety measures for our employees who must work in the offices and labs during the COVID-19 pandemic.

We are committed to diversity, equity and inclusion. On our Board of Directors: five of our twelve members are women and/or from minority racial and ethnic groups. As of January 31, 2021, women represented 54% of our global workforce and 27% of our global leadership (VP and above). As of January 31, 2021, 57% of our U.S. workforce, and 16% of our U.S. leadership (VP and above), were from minority racial and ethnic groups.

In addition to furthering our investments in our human resources, we plan on continuing our efforts in 2021 in critical environmental, social, and governance areas.

FACILITIES

Our corporate and research and development operations are located in San Francisco, California, where we lease approximately 234,000 square feet of office and laboratory space with approximately 35,000 square feet subleased. The lease for our San Francisco headquarters expires in 2023. We also lease approximately 67,000 square feet of office and manufacturing space in Beijing, China, and multiple office spaces in Beijing and Shanghai, China. Our leases in China expire in 2023. We have constructed a commercial manufacturing facility of approximately 5,500 square meters in Cangzhou, China, on approximately 33,000 square meters of land. Our right to use such land expires in 2068. We believe our facilities are adequate for our current needs and that suitable additional or substitute space would be available if needed.

AVAILABLE INFORMATION

Our internet website address is www.fibrogen.com. In addition to the information about us and our subsidiaries contained in this Annual Report, information about us can be found on our website. The information contained on, or that can be accessed through, our website is not part of, and is not incorporated into, this Annual Report.

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, are available free of charge through our website as soon as reasonably practicable after they are electronically filed with or furnished to the Securities and Exchange Commission (“SEC”). Additionally the SEC maintains an internet site that contains reports, proxy and information statements and other information. The address of the SEC’s website is www.sec.gov.

CORPORATE INFORMATION

Our headquarters are located at 409 Illinois Street, San Francisco, California 94158 and our telephone number is (415) 978-1200. Our website address is www.FibroGen.com.

Our subsidiaries consist of the following: 1) FibroGen Europe Oy, a majority owned entity incorporated in Finland in 1996; 2) Skin Sciences, Inc., a majority owned entity incorporated in the State of Delaware in 1995; 3) FibroGen International (Cayman) Limited, a majority owned entity incorporated in the Cayman Islands in 2011; 4) FibroGen China Anemia Holdings Ltd., a majority owned entity incorporated in the Cayman Islands in 2012; 5) FibroGen International (Hong Kong) Limited, a majority owned entity incorporated in Hong Kong in 2011; 6) FibroGen (China) Medical Technology Development Co., Ltd., a majority owned entity incorporated in China in 2011; and 7) Beijing Falikang Pharmaceutical Co. Ltd., an unconsolidated variable interest entity incorporated in China in 2020.

“FibroGen,” the FibroGen logo and other trademarks or service marks of FibroGen, Inc. appearing in this Annual Report are the property of FibroGen, Inc. This Annual Report contains additional trade names, trademarks and service marks of others, which are the property of their respective owners. We do not intend our use of display of other companies’ trade names, trademarks or service marks to imply a relationship with, or endorsement or sponsorship of us by, these other companies.

ITEM 1A. RISK FACTORS

Investing in our common stock involves a high degree of risk. You should carefully consider the risks described below in addition to the other information included or incorporated by reference in this Annual Report on Form 10-K, including our consolidated financial statements and the related notes and "Management's Discussion and Analysis of Financial Condition and Results of Operations," before deciding whether to invest in our common stock. The occurrence of any of the events or developments described below could harm our business, financial condition, results of operations and growth prospects. In such an event, the market price of our common stock could decline, and you may lose all or part of your investment. Although we have discussed all known material risks, the risks described below are not the only ones that we may face. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also impair our business operations.

Risks Related to the Development and Commercialization of Our Product Candidates

We are substantially dependent on the success of our lead product, roxadustat, and our second compound in development, pamrevlumab.

To date, we have invested a substantial portion of our efforts and financial resources in the research and development of roxadustat and pamrevlumab. While we have received approval of our New Drug Applications ("NDA") for roxadustat in the People's Republic of China ("China"), Japan, and Chile for chronic kidney disease ("CKD") anemia for patients on dialysis and not on dialysis, we and our partners will need to make substantial additional investments in the development and commercialization of roxadustat worldwide and in various indications. Our near-term prospects, including maintaining our existing collaborations with Astellas Pharma Inc. ("Astellas") and AstraZeneca AB ("AstraZeneca"), will depend heavily on successful development and commercialization of roxadustat, including obtaining additional regulatory approvals for the commercialization of roxadustat for anemia associated with CKD.

Our other lead product candidate, pamrevlumab, is currently in clinical development for idiopathic pulmonary fibrosis ("IPF"), pancreatic cancer, and Duchenne muscular dystrophy ("DMD"). Pamrevlumab requires substantial further development and investment and we do not have a collaboration partner for support of this compound. In addition, pamrevlumab is a monoclonal antibody, which may require greater financial resources than for our small molecule, roxadustat.

As a company, we have limited commercialization experience, and the time and resources to develop such experience are significant. If we fail to achieve and sustain commercial success for roxadustat with our collaboration partners, our business would be harmed.

We do not have a sales or marketing infrastructure and have limited experience in the sales, marketing or distribution of pharmaceutical products in any country. To achieve commercial success for any product for which we obtain marketing approval, we will need to establish sales and marketing capabilities or make and maintain our existing arrangements with third parties to perform these services at a level sufficient to support our commercialization efforts.

To the extent that we would undertake sales and marketing of any of our products directly, there are risks involved with establishing our own sales, marketing and distribution capabilities. Factors that may inhibit our efforts to commercialize our products on our own include:

- our inability to recruit, train and retain adequate numbers of effective sales and marketing personnel;
- the inability of sales personnel to obtain access to physicians or persuade adequate numbers of physicians to prescribe any future products;
- our inability to effectively manage geographically dispersed commercial teams;
- the lack of complementary products to be offered by sales personnel, which may put us at a competitive disadvantage relative to companies with more extensive product lines; and
- unforeseen costs and expenses associated with creating an independent commercial organization.

With respect to roxadustat, we are dependent on the commercialization capabilities of our collaboration partners, AstraZeneca and Astellas. If either such partner were to terminate its agreement with us, we would have to commercialize on our own or with another third party. We will have limited control over the commercialization efforts of such third parties, and any of them may fail to devote the necessary resources and attention to sell and market our products, if any, effectively. If they are not successful in commercializing our product candidates, our business and financial condition would suffer.

Commercializing roxadustat requires us to establish commercialization systems, including but not limited to, medical affairs, pharmacovigilance, supply-chain, and distribution capabilities to perform our portion of the collaborative efforts. These efforts require resources and time. If we, along with Astellas and AstraZeneca, are not successful in our marketing, pricing and reimbursement strategies, facilitating adoption by dialysis organizations, health care professionals, recruiting sales and marketing personnel or in building a sales and marketing infrastructure, we will have difficulty commercializing roxadustat, which would adversely affect our business and financial condition.

Although regulatory approval has been obtained for roxadustat in China, Japan, and Chile, we may be unable to obtain regulatory approval in other countries, or such approval may be delayed or limited, due to a number of factors, many of which are beyond our control.

The clinical trials and the manufacturing of our product candidates are and will continue to be, and the marketing of our product candidates will be, subject to extensive and rigorous review and regulation by numerous government authorities in the United States ("U.S.") and in other countries where we intend to develop and, if approved, market any product candidates. Before obtaining regulatory approval for the commercial sale of any product candidate, we must demonstrate through extensive preclinical trials and clinical trials that the product candidate is safe and effective for use in each indication for which approval is sought. The regulatory review and approval process is expensive and requires substantial resources and time, and in general, very few product candidates that enter development ultimately receive regulatory approval. In addition, our collaboration partners for roxadustat have final control over development decisions in their respective territories and they may make decisions with respect to development or regulatory authorities that delay or limit the potential approval of roxadustat, or increase the cost of development or commercialization. Accordingly, we may be unable to successfully develop or commercialize roxadustat, pamrevlumab, or any of our other product candidates in one or more indications and jurisdictions.

Moreover, for any Phase 3 clinical trial to support an NDA/Biologics License Application submission for approval, the U.S. Food and Drug Administration ("FDA") and foreign regulatory authorities require compliance with regulations and standards (including good clinical practices ("GCP") requirements for designing, conducting, monitoring, recording, analyzing, and reporting the results of clinical trials) to ensure that (1) the data and results from trials are credible and accurate; and (2) that the rights, integrity and confidentiality of trial participants are protected. Although we rely on third parties to conduct our clinical trials, we as the sponsor remain responsible for ensuring that each of these clinical trials is conducted in accordance with its general investigational plan and protocol under legal and regulatory requirements, including GCP. Regulatory authorities enforce these GCP requirements through periodic inspections of trial sponsors, principal investigators and trial sites. If we or any of our clinical research organizations ("CROs"), trial sites, principal investigators or other third parties fail to comply with applicable GCP requirements, the clinical data generated in our clinical trials may be deemed unreliable. Accordingly, the FDA or other regulatory authorities may require us to exclude the use of patient data from these unreliable clinical trials, or perform additional clinical trials before approving our marketing applications. The FDA or other regulatory authorities may even reject our application for approval or refuse to accept our future applications.

Regulatory authorities may take actions or impose requirements that delay, limit or deny approval of our product candidates for many reasons, including, among others:

- our failure to adequately demonstrate to the satisfaction of regulatory authorities that roxadustat is safe and effective in treating anemia in CKD or that pamrevlumab is safe and effective in treating IPF, pancreatic cancer, or DMD;
- our failure to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;
- our failure of clinical trials to meet the level of statistical significance required for approval;
- the determination by regulatory authorities that additional clinical trials are necessary to demonstrate the safety and efficacy of roxadustat or pamrevlumab, or that ongoing clinical trials need to be modified in design, size, conduct or implementation;
- our product candidates may exhibit an unacceptable safety signal as they advance through clinical trials, in particular controlled Phase 3 trials;

- the CROs that conduct clinical trials on our behalf may take actions outside of our control that materially adversely impact our clinical trials;
- we or third-party contractors manufacturing our product candidates may not maintain current good manufacturing practices ("cGMP"), successfully pass inspection or meet other applicable manufacturing regulatory requirements;
- regulatory authorities may not agree with our interpretation of the data from our preclinical trials and clinical trials; or
- collaboration partners may not perform or complete their clinical programs in a timely manner, or at all.

Any of these factors, many of which are beyond our control, could jeopardize our or our collaboration partners' abilities to obtain regulatory approval for our product candidates in one or more indications.

The FDA or other regulatory authorities may require more information (including additional preclinical or clinical data to support approval), which may delay or prevent approval or cause us to abandon the development program altogether. In addition, if our product candidates produce undesirable side effects or safety issues, the FDA may require the establishment of Risk Evaluation and Mitigation Strategy ("REMS") (or other regulatory authorities may require the establishment of a similar strategy), that may restrict distribution of our approved products, if any, and impose burdensome implementation requirements on us.

The results of the FDA Cardiovascular and Renal Drugs Advisory Committee meeting may affect roxadustat's approvability or label in CKD anemia.

On March 1, 2021, the FDA informed us that the Cardiovascular and Renal Drugs Advisory Committee will hold an advisory committee meeting to review the NDA for roxadustat. The date of the advisory committee meeting has not been set. As a result of this communication, we will not receive an approval decision by the PDUFA goal date of March 20, 2021. The advisory committee is a committee of external experts which will provide input on issues relating to benefit, risk, and interpretation of our roxadustat clinical trial data. We do not know when the FDA will convene the advisory committee or how long it will take after the committee convenes for the FDA to make a decision on our NDA. The results of the advisory committee may affect roxadustat's approvability or label. The FDA may further delay approval of our NDA if applicable regulatory criteria are not satisfied and/or the FDA requires additional testing or information. The full extent of the delay on an approval decision and impact of the advisory committee is unknown.

Preclinical, Phase 1 and Phase 2 clinical trial results may not be indicative of the results that may be obtained in larger clinical trials.

Clinical development is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process. Success in preclinical and early clinical trials, which are often highly variable and use small sample sizes, may not be predictive of similar results in humans or in larger, controlled clinical trials, and successful results from clinical trials in one indication may not be replicated in other indications.

Many companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late-stage clinical trials after achieving positive results in early-stage development, and we may face similar setbacks.

We do not know whether our ongoing or planned clinical trials of roxadustat or pamrevlumab will need to be redesigned based on interim results or if we will be able to achieve sufficient patient enrollment or complete planned clinical trials on schedule.

Clinical trials can be delayed or terminated for a variety of reasons, including delay or failure to:

- address any physician or patient safety concerns that arise during the course of the trial;
- obtain required regulatory or institutional review board approval or guidance;
- reach timely agreement on acceptable terms with prospective CROs and clinical trial sites;
- recruit, enroll and retain patients through the completion of the trial, including for the duration of the Severe Acute Respiratory Syndrome Coronavirus 2 and the resulting Coronavirus Disease ("COVID-19") pandemic;
- maintain clinical sites in compliance with clinical trial protocols;
- initiate or add a sufficient number of clinical trial sites; and
- manufacture sufficient quantities of product candidate for use in clinical trials.

In particular, identifying and qualifying patients to participate in clinical trials of our product candidates is critical to our success. The timing of our clinical trials depends on the rate at which we can recruit and enroll patients in testing our product candidates. Patients may be unwilling to participate in clinical trials of our product candidates for a variety of reasons, some of which may be beyond our control, including:

- severity of the disease under investigation;
- availability of alternative treatments;
- size and nature of the patient population;
- eligibility criteria for and design of the study in question;
- perceived risks and benefits of the product candidate under study;
- ability to enroll patients in clinical trials during the COVID-19 pandemic (particularly for IPF);
- ongoing clinical trials of competitive agents;
- physicians' and patients' perceptions of the potential advantages of our product candidates being studied in relation to available therapies or other products under development;
- our CRO's and our trial sites' efforts to facilitate timely enrollment in clinical trials;
- patient referral practices of physicians; and
- ability to monitor patients and collect patient data adequately during and after treatment.

If we have difficulty enrolling a sufficient number of patients to conduct our clinical trials as planned, we may need to delay, limit or terminate on-going or planned clinical trials.

In addition, we could encounter delays if a clinical trial is suspended or terminated by us, by the relevant institutional review boards at the sites at which such trials are being conducted, or by the FDA or other regulatory authorities. A suspension or termination of clinical trials may result from any number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by the FDA or other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, changes in laws or regulations, or a principal investigator's determination that a serious adverse event could be related to our product candidates. Any delays in completing our clinical trials will increase the costs of the trial, delay the product candidate development and approval process and jeopardize our ability to commence marketing and generate revenues. Any of these occurrences may materially and adversely harm our business, operations, and prospects.

Our product candidates may cause or have attributed to them undesirable side effects or have other properties that delay or prevent their regulatory approval or limit their commercial potential.

Undesirable side effects caused by our product candidates or that may be identified as related to our product candidates by physician investigators conducting our clinical trials or even competing products in development that utilize a similar mechanism of action or act through a similar biological disease pathway could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in the delay or denial of regulatory approval by the FDA or other regulatory authorities and potential product liability claims. If we determine that there is a likely causal relationship between a serious adverse event and our product candidate, and such safety event is material or significant enough, it may result in:

- our clinical trial development plan becoming longer and more extensive;
- regulatory authorities increasing the data and information required to approve our product candidates and imposing other requirements; and
- our collaboration partners terminating our existing agreements.

The occurrence of any or all of these events may cause the development of our product candidates to be delayed or terminated, which could materially and adversely affect our business and prospects. Refer to "*Business — Overview*" in our Annual Report on Form 10-K for the year ended December 31, 2020 for a discussion of the adverse events and serious adverse events that have emerged in clinical trials of roxadustat and pamrevlumab.

Clinical trials of our product candidates may not uncover all possible adverse effects that patients may experience.

Clinical trials are conducted in representative samples of the potential patient population, which may have significant variability. Clinical trials are by design based on a limited number of subjects and of limited duration for exposure to the product used to determine whether, on a potentially statistically significant basis, the planned safety and efficacy of any product candidate can be achieved. As with the results of any statistical sampling, we cannot be sure that all side effects of our product candidates may be uncovered, and it may be the case that only with a significantly larger number of patients exposed to the product candidate for a longer duration, that a more complete safety profile is identified. Further, even larger clinical trials may not identify rare serious adverse effects or the duration of such studies may not be sufficient to identify when those events may occur. There have been other products, including erythropoiesis stimulating agents ("ESAs"), for which safety concerns have been uncovered following approval by regulatory authorities. Such safety concerns have led to labeling changes or withdrawal of ESAs products from the market. While our most advanced product candidate is chemically unique from ESAs, it or any of our product candidates may be subject to known or unknown risks. Patients treated with our products, if approved, may experience adverse reactions and it is possible that the FDA or other regulatory authorities may ask for additional safety data as a condition of, or in connection with, our efforts to obtain approval of our product candidates. If safety problems occur or are identified after our product candidates reach the market, we may, or regulatory authorities may require us to amend the labeling of our products, recall our products or even withdraw approval for our products.

If we or our manufacturers cannot properly manufacture sufficient product, we may experience delays in development, regulatory approval, launch or successful commercialization.

Completion of our clinical trials and commercialization of our products require access to, or development of, facilities to manufacture and manage our product candidates at sufficient yields, quality and at commercial scale. Although we have entered into commercial supply agreements for roxadustat and pamrevlumab, we will need to enter into additional commercial supply agreements, including for backup or second source third-party manufacturers. We may not be able to enter into these agreements with satisfactory terms or on a timely manner. In addition, we may experience delays or technical problems associated with technology transfer of manufacturing processes to any new suppliers.

We have limited experience manufacturing or managing third parties in manufacturing any of our product candidates in the volumes that are expected to be necessary to support large-scale clinical trials and sales. In addition, we have limited experience forecasting supply requirements or coordinating supply chain (including export management) for launch or commercialization, which is a complex process involving our third-party manufacturers and logistics providers, and for roxadustat, our collaboration partners. We may not be able to accurately forecast supplies for commercial launch, or do so in a timely manner and our efforts to establish these manufacturing and supply chain management capabilities may not meet our requirements as to quantities, scale-up, yield, cost, potency or quality in compliance with cGMP, particularly if the marketing authorization or market uptake is more rapid than anticipated or we have an unanticipated surge in demand.

We have a limited amount of roxadustat and pamrevlumab in storage, limited capacity reserved at our third-party manufacturers, and, even if we have or are able to put supply agreements in place for our products, there are long lead times required to manufacture and scale-up the manufacture of additional supply, as required for both late-stage clinical trials, post-approval trials, and commercial supply. If we are unable to forecast, order or manufacture sufficient quantities of roxadustat or pamrevlumab on a timely basis, it may delay our development, launch or commercialization in some or all indications we are currently pursuing. Any delay or interruption in the supply of our product candidates or products could have a material adverse effect on our business and operations.

Our commercial drug product and the product we use for clinical trials must be produced under applicable cGMP regulations. Failure to comply with these regulations may require us to recall commercial product or repeat clinical trials, which would impact sales revenue or delay the regulatory approval process.

We may add or change manufacturers for our products. We may also make changes to our manufacturing processes or to our product specifications, including in order to accommodate changes in regulations, manufacturing equipment or to account for different processes at new or second source suppliers. If we make any such changes with respect to roxadustat or pamrevlumab we will need to demonstrate comparability to the products and processes already approved or in approval by various regulatory authorities, including potentially through the conduct of additional clinical trials. Even if we do demonstrate comparability, a regulatory agency could challenge that result which could delay our development or commercialization progress. Any of these occurrences may materially impact our operations and potential profitability.

We, and even an experienced third-party manufacturer, may encounter difficulties in production. Difficulties may include:

- costs and challenges associated with scale-up and attaining sufficient manufacturing yields, in particular for biologic products such as pamrevlumab, which is a monoclonal antibody;
- contracting with additional suppliers and validation/qualification of additional facilities to meet growing demand;
- supply chain issues, including coordination of multiple contractors in our supply chain and securing necessary licenses (such as export licenses);
- the timely availability and shelf life requirements of raw materials and supplies;
- limited stability and product shelf life;
- equipment maintenance issues or failure;
- quality control and quality assurance issues;
- shortages of qualified personnel and capital required to manufacture large quantities of product;
- compliance with regulatory requirements that vary in each country where a product might be sold;
- capacity or forecasting limitations and scheduling availability in contracted facilities; and
- natural disasters, such as pandemics, including the COVID-19 pandemic, floods, storms, earthquakes, tsunamis, and droughts, or accidents such as fire, that affect facilities, possibly limit or postpone production, and increase costs.

Regulatory authorities will do their own benefit risk analysis and may reach a different conclusion than we or our partners have, and these regulatory authorities may base their approval decision on different analyses, data, and statistical methods than ours.

Even if we believe we have achieved positive clinical results, such as superiority or non-inferiority, in certain endpoints, populations or subpopulations, or using certain statistical methods of analysis, the FDA and European Medicines Agency ("EMA") will each conduct their own benefit-risk analysis and may reach different conclusions, using different statistical methods, different endpoints or definitions thereof, or different patient populations or sub-populations, and regulatory authorities may change their approvability criteria based on their internal analyses and discussions with expert advisors. Regulatory authorities may approve roxadustat for fewer or more limited indications than we request or may grant approval contingent on the performance of costly post-approval clinical trials. While we will present to regulatory authorities certain pre-specified and not pre-specified sub-populations and sub-group analyses (for example, incident dialysis), multiple secondary endpoints, and multiple analytical methods (such as long-term follow up analyses), including adjusted and censored data, regulatory authorities may reject these analyses, methods, or even parts of our trial design or certain data from our studies, the rationale for our pre-specified non-inferiority margins or other portions of our statistical analysis plans. In addition, even if we are able to provide positive data with respect to certain analyses, such as incident dialysis, estimated glomerular filtration rate, hepcidin, or quality of life measures, regulatory authorities may not include such claims on any approved labeling for roxadustat, which may limit the commercialization or market opportunity for roxadustat. The failure to obtain regulatory approval, or any label, population or other approval limitations in any jurisdiction, may significantly limit our ability to generate revenues, and any failure to obtain such approval for all of the indications and labeling claims we deem desirable could reduce our potential revenue.

Even if we are able to obtain regulatory approval of our product candidates, the label we obtain may limit the indicated uses for which our product candidates may be marketed.

With respect to roxadustat, regulatory approvals obtained, could limit the approved indicated uses for which roxadustat may be marketed. For example, our label approved in Japan, includes the following warning: "Serious thromboembolism such as cerebral infarction, myocardial infarction, and pulmonary embolism may occur, possibly resulting in death, during treatment with roxadustat." Additionally, in the U.S., ESAs have been subject to significant safety warnings, including the boxed warnings on their labels. The safety concerns relating to ESAs may result in labeling for roxadustat containing similar warnings even if our Phase 3 clinical trials do not suggest that roxadustat has similar safety issues. Even if the label for roxadustat does not contain all of the warnings contained in the boxed warning for ESAs, the label for roxadustat may contain other warnings or limit the market opportunity or approved indications for roxadustat. These warnings could include warnings against exceeding specified hemoglobin targets and other warnings that derive from the lack of clarity regarding the safety issues associated with ESAs, even if our Phase 3 clinical trials do not themselves raise safety concerns.

We face substantial competition in the discovery, development and commercialization of product candidates.

The development and commercialization of new pharmaceutical products is highly competitive. Our future success depends on our ability and/or the ability of our collaboration partners to achieve and maintain a competitive advantage with respect to the development and commercialization of our product candidates. Our objective is to discover, develop and commercialize new products with superior efficacy, convenience, tolerability, and safety. We expect that in many cases, the products that we commercialize will compete with existing, market-leading products of companies that have large, established commercial organizations.

If roxadustat is approved and launched commercially, competing drugs are expected to include ESAs, particularly in those patient segments where ESAs are used. Currently available ESAs include epoetin alfa (EPOGEN®, marketed by Amgen Inc. in the U.S., Procrit® and Erypo®/Eprex®, marketed by Johnson & Johnson Inc., and Espo® marketed by Kyowa Hakko Kirin in Japan and China), darbepoetin (Amgen/Kyowa Hakko Kirin's Aranesp® and NESP®) and Mircera® marketed by Hoffmann-La Roche ("Roche") outside of the U.S. and by Vifor Pharma, a Roche licensee, in the U.S. and Puerto Rico, as well as biosimilar versions of these currently marketed ESA products. ESAs have been used in the treatment of anemia in CKD for more than 30 years, serving a significant majority of dialysis CKD patients. While non-dialysis CKD patients who are not under the care of nephrologists, including those with diabetes and hypertension, do not typically receive ESAs and are often left untreated, some non-dialysis patients under nephrology or hematology care may be receiving ESA therapy. It may be difficult to encourage healthcare providers and patients to switch to roxadustat from products with which they have become familiar.

We may also face competition from potential new anemia therapies currently in clinical development, including in those patient segments not adequately addressed by ESAs. Companies that are currently developing hypoxia-inducible factor ("HIF") prolyl hydroxylase (together with HIF, "HIF-PH") inhibitors for anemia in CKD indications include GlaxoSmithKline plc ("GSK"), Bayer Corporation ("Bayer"), Akebia Therapeutics, Inc. ("Akebia"), Otsuka Pharmaceutical ("Otsuka"), Akebia's partner in the U.S. and Europe, Japan Tobacco, and Zydus Cadila (India) ("Zydus"). Akebia has completed Phase 3 studies in CKD patients on dialysis and not on dialysis in the U.S., as well as a Phase 3b, randomized, open-label, active-controlled trial evaluating the efficacy and safety of oral vadadustat once daily and three times weekly for the maintenance treatment of anemia in hemodialysis subjects converting from erythropoiesis stimulating agents. The study completion date is estimated to be May 2022. Akebia announced an additional Phase 3 study evaluating the efficacy and safety of dose conversion from a long-acting erythropoiesis stimulating agent (Mircera®) to three times weekly oral vadadustat for the maintenance treatment of anemia in hemodialysis subjects. The estimated study start date is February 2021. Akebia has publicly stated their intent to file the vadadustat NDA in the U.S. in the second quarter of 2021.

In Japan, Mitsubishi Tanabe Pharmaceutical Corporation, Akebia's collaboration partner, received approval for vadadustat on June 29, 2020 for the treatment of anemia of CKD patients on and not on dialysis. GSK received approval for daprodustat in Japan on June 29, 2020 for the treatment of anemia of CKD patients on and not on dialysis. Price listing for the launch in Japan of both vadadustat and daprodustat occurred in the third quarter of 2020, with pricing in line with roxadustat pricing. GSK is also conducting global Phase 3 studies in CKD patients on dialysis and not on dialysis, and expects to complete those studies by March 2022. GSK and Kyowa Hakko Kirin announced in November 2018 that the two companies signed a strategic commercialization deal in Japan for daprodustat. Bayer has completed global Phase 2 studies and its HIF-PH inhibitor is now in Phase 3 development in CKD populations on dialysis and not on dialysis in Japan. Japan Tobacco received approval in Japan for enarodustat for the treatment of anemia in CKD patients on dialysis and not on dialysis, to be sold by Torii Pharmaceuticals Ltd as ENAROY®. Japan Tobacco and its partner JW Pharmaceuticals started a Phase 3 study in dialysis patients in Korea in 2019. Zydus started Phase 3 studies in dialysis and non-dialysis CKD patients in India in 2019.

In July 2020, Zydus received approval from the FDA to begin a Phase 1 study of desidustat for the treatment of chemotherapy-induced anemia, which could potentially be competitive with roxadustat within this indication.

Reblozyl® (luspatercept) was approved by the FDA in April 2020 for the treatment of anemia in adults with myelodysplastic syndromes with ring sideroblasts or myelodysplastic/myeloproliferative neoplasms with ring sideroblasts and thrombocytosis who need regular red blood cell transfusions and have not responded well to or cannot receive an ESA. It is the first and only erythroid maturation agent approved in the U.S., Europe, and Canada and is part of a global collaboration between Acceleron Pharma, Inc. and Bristol Myers Squibb. In 2020, Reblozyl net revenue was $274 million, including $115 million in Q4 2020.

In addition, we will likely face competition from other companies developing biologic therapies for the treatment of other anemia indications that we may also seek to pursue in the future. We may face competition for patient recruitment, enrollment for clinical trials, and potentially in commercial sales. There may also be new therapies for renal-related diseases that could limit the market or level of reimbursement available for roxadustat.

In China, ESA is considered the standard of care for treatment of anemia of CKD, and locally manufactured epoetin alfa is offered by 15 local manufacturers including the market leader EPIAO that is marketed by 3SBio Inc. We may face potential competition from other HIF-PH inhibitors. Companies active in the US such as Akebia, Bayer, and GSK have been authorized by the National Medical Products Administration ("NMPA") to conduct trials in China to support its ex-China regulatory filings. A number of domestic companies, including Jiangsu Hengrui Medicine Co., Ltd., Guandong Sunshine Health Investment Co., Ltd., 3SBio Inc., and Hangzhou Andao Pharmaceutical Co. have been permitted by the NMPA to conduct clinical trials in their locally-developed HIF-PH inhibitor investigational compounds for the treatment of anemia in CKD. Domestic companies are also in-licensing global compounds to be developed as domestic drugs, including China Medical System which in-licensed desidustat, a compound that is currently in Phase 3 trials in India, from Zydus for greater China in January 2020. In January 2021, China Medical System Holdings Ltd. was granted approval by the Chinese NMPA to begin trials for desidustat in patients with anemia of CKD, including dialysis and non-dialysis patients. Shenzhen Salubris Pharmaceutical Co., Ltd., a domestic company in China, has in-licensed enarodustat from Japan Tobacco and received NMPA approval in the third quarter of 2020 to initiate Phase 3 studies. We will also face competition from generics who could enter the market after expiry of our patents in China, and two potential market players have already started bioequivalence studies, including Chia Tai-Tiangqing Pharmaceutical Holdings and CSPA Pharmaceutical Group.

The first biosimilar ESA, Pfizer's Retacrit® (epoetin zeta), entered the U.S. market in November 2018. Market penetration of Retacrit and the potential addition of other biosimilar ESAs currently under development may alter the competitive and pricing landscape of anemia therapy in CKD patients on dialysis under the end-stage renal disease bundle. The patents for Amgen's EPOGEN® (epoetin alfa) expired in 2004 in Europe, and the final material patents in the U.S. expired in May 2015. Several biosimilar versions of currently marketed ESAs are available for sale in Europe, China and other territories. In the U.S., a few ESA biosimilars are currently under development. Sandoz, a division of Novartis, markets Binocrit® (epoetin alfa) in Europe and may file a biosimilar Biologics License Application in the U.S.

The majority of the current CKD anemia market focuses on dialysis patients, who visit dialysis centers on a regular basis, typically three times a week, and anemia therapies are administered as part of the visit. Two of the largest operators of dialysis clinics in the U.S., DaVita Healthcare Partners Inc. ("DaVita"), and Fresenius Medical Care AG & Co. KGaA ("Fresenius"), collectively provide dialysis care to more than 80% of U.S. dialysis patients, and therefore have historically executed long-term contracts including rebate terms with Amgen. Successful penetration in this market will likely require our partner AstraZeneca to enter into a definitive agreement with Fresenius, DaVita, or other dialysis organizations, on favorable pricing terms and on a timely basis.

If approved and launched commercially to treat IPF, pamrevlumab is expected to compete with Roche's Esbriet® (pirfenidone), and Boehringer Ingelheim's Ofev® (nintedanib). We believe that if pamrevlumab can be shown to safely stabilize or reverse lung fibrosis, and thus stabilize or improve lung function in IPF patients, it can compete with pirfenidone and nintedanib for market share in IPF. However, it may be difficult to encourage treatment providers and patients to switch to pamrevlumab from an oral product with which they are already familiar to a product delivered via in-office infusion. Furthermore, pirfenidone and nintedanib may be produced as generics in the near future. We may also face competition from potential new IPF therapies in recruitment and enrollment in our clinical trials and potentially in commercialization.

Pamrevlumab is a monoclonal antibody that may be more expensive and less convenient than oral small molecules such as nintedanib and pirfenidone. Other potential competitive product candidates in various stages of development for IPF include Kadmon Holdings, Inc.'s KD025, Liminal BioSciences' PBI-4050, and Roche/Promedior, Inc.'s PRM-151.

If pamrevlumab is approved and launched commercially to treat locally advanced pancreatic cancer patients who are not candidates for surgical resection, pamrevlumab may face competition from products currently used for pancreatic cancer. These include FOLFRINOX, a combination chemotherapy regimen of folic acid, 5-fluouracil, oxaliplatin and irinotecan, and agents seeking approval in combination with gemcitibine and nab-paclitaxel from companies such as Rafael Pharma's defactinib/CPI-613 and Merrimack's istiratumab. Gemcitabine and/or nab-paclitaxel are the current standard of care in the first-line treatment of metastatic pancreatic cancer.

Celgene Corporation's Abraxane® (nab-paclitaxel) was launched in the U.S. and Europe in 2013 and 2014, and was the first drug approved in this disease in nearly a decade.

If approved and launched commercially to treat DMD, pamrevlumab is expected to face competition from drugs that have been approved in major markets such as the U.S., European Union, and Japan. On September 19, 2016, the FDA approved Sarepta Therapeutics Inc.'s ("Sarepta") Exondys 51™ (eteplirsen). Exondys 51 is approved to treat patients who have a mutation of the dystrophin gene amenable to exon 51 skipping, representing approximately 13% of patients with DMD. In Europe, Sarepta received a negative opinion for its marketing application for eteplirsen from the EMA in September 2018. Sarepta has reported a full year Exondys 51 revenue of $380 million in 2019. Sarepta's Vyondys 53™ (golodirsen) was approved by the FDA in December 2019 for patients with a confirmed genetic mutation that is amenable to exon 53 skipping, which accounts for approximately 8% of the DMD population. Sarepta's Amondys 45™ (casimersen) was approved by the FDA in February 2021 for patients with a confirmed genetic mutation that is amenable to exon 45 skipping, which accounts for approximately 8% of the DMD population.

PTC Therapeutics' product Translarna ™ received a conditional approval in Europe in 2014, which was renewed in November 2016 with a request for a new randomized placebo-controlled 18-month study by the Committee for Medicinal Products for Human Use of the EMA; however, the FDA informed the sponsor in a complete response letter in October 2017, as well as in its response to PTC Therapeutics' appeal, that the FDA is unable to approve the application in its current form. An additional Phase 3 study is currently ongoing. While Translarna ™ targets a different set of DMD patients from those targeted by Sarepta's Exondys 51®, it is also limited to a subset of patients who carry a specific mutation. Conversely, pamrevlumab is intended to treat DMD patients without limitation to type of mutation.

Pamrevlumab may also face competition from other drugs currently in clinical development in patient recruiting and enrollment in clinical trials, and, if approved, in commercialization. Examples of those compounds currently under clinical development are the drug candidates from Pfizer, Pliant, Galecto, and Sarepta. Pfizer initiated a Phase 3 study with PF-06939926, its AAV9 mini-dystrophin gene therapy for DMD in February 2020. Pliant's PLN-74809 and Galecto's lead candidate GB0139, are in Phase 2 development for IPF.

The success of any or all of these potential competitive products may negatively impact the development and potential for success of pamrevlumab. In addition, any competitive products that are on the market or in development may compete with pamrevlumab for patient recruitment and enrollment for clinical trials or may force us to change our clinical trial design, including, in order to compare pamrevlumab against another drug, which may be the new standard of care.

Moreover, many of our competitors have significantly greater resources than we do. Large pharmaceutical companies, in particular, have extensive experience in clinical testing, obtaining regulatory approvals, recruiting patients, manufacturing pharmaceutical products, and commercialization. In the potential anemia market for roxadustat, for example, large and established companies such as Amgen and Roche, among others, compete aggressively to maintain their market shares. In particular, the currently marketed ESA products are supported by large pharmaceutical companies that have greater experience and expertise in commercialization in the anemia market, including in securing reimbursement, government contracts and relationships with key opinion leaders; conducting testing and clinical trials; obtaining and maintaining regulatory approvals and distribution relationships to market products; and marketing approved products. These companies also have significantly greater scale, research and marketing capabilities than we do and may also have products that have been approved or are in later stages of development and have collaboration agreements in our target markets with leading dialysis companies and research institutions. If we and our collaboration partners are not able to compete effectively against existing and potential competitors, our business and financial condition may be materially and adversely affected.

No or limited reimbursement or insurance coverage of our approved products, if any, by third-party payors may render our products less attractive to patients and healthcare providers.

Market acceptance and sales of any approved products will depend significantly on reimbursement or coverage of our products by government or third-party payors and may be affected by existing and future healthcare reform measures or prices of related products for which the government or third-party reimbursement applies. Coverage and reimbursement by the government or a third-party payor may depend upon a number of factors, including the payor's determination that use of a product is:

- a covered benefit under applicable health plan;
- safe, effective and medically necessary;
- appropriate for the specific patient;
- cost-effective; and
- neither experimental nor investigational.

Obtaining coverage and reimbursement approval for a product from a government or other third-party payor is a time consuming and costly process that could require us to provide supporting scientific, clinical and cost-effectiveness data for the use of our products to the payor, which we may not be able to provide. Furthermore, the reimbursement policies of governments and third-party payors may significantly change in a manner that renders our clinical data insufficient for adequate reimbursement or otherwise limits the successful marketing of our products. Even if we obtain coverage for our product candidates, the pricing may be subject to re-negotiations or third-party payors may not establish adequate reimbursement amounts, which may reduce the demand for, or the price of, our products. For example, our current National Reimbursement Drug List reimbursement pricing for China is effective for a standard two-year period (between January 1, 2020 to December 31, 2021), after which time we will have to renegotiate a new price for roxadustat, which we expect to be lower based upon historical precedents.

Reference pricing is used by various Europe member states and parallel distribution, or arbitrage between low-priced and high-priced member states, can further reduce prices. In some countries, our partner or we may be required to conduct a clinical trial or other studies that compare the cost-effectiveness of our product candidates to other available products in order to obtain or maintain reimbursement or pricing approval. Publication of discounts by third-party payors or authorities may lead to further pressure on the prices or reimbursement levels within the country of publication and other countries. If reimbursement of our products is unavailable or limited in scope or amount, or if pricing is set at unacceptable levels, we or our partner may elect not to commercialize our products in such countries, and our business and financial condition could be adversely affected.

Risks Related to Severe Acute Respiratory Syndrome Coronavirus 2 and the Resulting Coronavirus Disease ("COVID-19")

Our business could continue to be adversely affected by the ongoing COVID-19 global pandemic.

The effects of the COVID-19 pandemic, the associated government-mandated restrictions and the other effects on healthcare systems, the economy, and society as a whole, may negatively impact productivity, disrupt our business, and delay our clinical programs and timelines, the magnitude of which will depend, in part, on the progression of the disease, the length and severity of the restrictions, and other impacts and limitations on our ability to conduct our business in the ordinary course. These disruptions in our operations could negatively impact our business, operating results, and financial condition. While certain COVID-19 vaccines have received regulatory approval, it is uncertain if and when sufficient vaccines will have been distributed to lessen the economic and other effects of COVID-19, and the efficacy of such vaccines in preventing the spread and effects of COVID-19 and other variants is unclear.

The extent of the impact on the COVID-19 pandemic on our business and financial results will continue to depend on numerous evolving factors that we are not able to accurately predict and which will vary by market, including the duration and scope of the pandemic, global economic conditions during and after the pandemic, the speed and efficacy of vaccinations around the world, and governmental actions that have been taken, or may be taken in the future, in response to the pandemic.

We have taken measures to minimize the health risks of COVID-19 to our staff, patients, healthcare providers, and their communities, as their safety and well-being are our top priority. Despite these efforts, there is a risk that one or more of our employees, including members of senior management, could contract COVID-19. Our U.S. employees are working remotely when possible, and we may experience reduced productivity due to the remote work environment. In addition, there are other risks from remote work including but not limited to the potential for reduced oversight of third parties we work with, such as manufacturing and clinical sites.

China was able to minimize the impact of COVID-19 on the economy in 2020 relative to other major economies. However, if there are any further COVID-19 outbreaks, we or our partners may need to re-institute or tighten restrictions on our operations.

We have seen impacts from COVID-19 on all of our clinical trials to varying degrees. There is a risk that any or all of our clinical trials will be further delayed, in particular our studies in IPF, due to a continued or further outbreak which can slow or pause enrollment or site initiation and other direct COVID-19 impacts to clinical sites and clinical service providers. In addition, while we are trying to mitigate the effect of COVID-19 on existing patients, it is possible that some patients may not be able to continue to comply with protocols, which could further delay our clinical trial progress.

We believe we have sufficient roxadustat and pamrevlumab supplies for our expected commercial and clinical requirements over the next year and we and our manufacturing partners are currently continuing manufacturing operations. However, we only have a limited stockpile of these drug supply products, and therefore, if there is a greater impact from the COVID-19 pandemic than we have expected, or if manufacturing operations are halted again, or if drug product expires due to slowed clinical trials, we could face shortages in our global supply chains. COVID-19 has created increased demand for the limited global biologics manufacturing capacity, and as a result, we have faced competition for manufacturing supplies due to prioritization of COVID-19 related manufacturing. We could face additional competition for such manufacturing supplies, including reagents, supplements and media, and may face competition to use available capacity at our manufacturing partners. Any such supply disruptions could adversely impact our clinical development and ability to generate revenues from our approved products and our business, financial condition, results of operations and growth prospects could be materially adversely affected. There may be unexpected regulatory delays due to the COVID-19 pandemic including due to travel restrictions impacting pre-approval inspections.

Due to these and potentially additional business disruptions, there may be delays to any of our business areas including our drug supply chains, problems with our distribution or warehousing vendors, or delays to our (and our partners') clinical trials or other development efforts, or commercialization and launch activities. The full extent of these effects are unknown, but all of them could have a material impact on our operations and revenue.

In addition, to the extent the ongoing COVID-19 pandemic adversely affects our business and results of operations, it may also have the effect of heightening many of the other risks and uncertainties described in this "*Risk Factors*" section.

Risks Related to Our Reliance on Third Parties

If our collaborations were terminated or if Astellas or AstraZeneca were to prioritize other initiatives over their collaborations with us, our ability to successfully develop and commercialize our product candidates would suffer.

We have entered into collaboration agreements with respect to the development and commercialization of our lead product candidate, roxadustat, with Astellas and AstraZeneca. These agreements provide for reimbursement of our development costs by our collaboration partners and also provide for commercialization of roxadustat throughout the major territories of the world.

Our agreements with Astellas and AstraZeneca provide each of them with the right to terminate their respective agreements with us, upon the occurrence of negative clinical results, delays in the development and commercialization of our product candidates or adverse regulatory requirements or guidance. In addition, each of those agreements provides our respective partners the right to terminate any of those agreements upon written notice for convenience. The termination of any of our collaboration agreements would require us to fund and perform the further development and commercialization of roxadustat in the affected territory, or pursue another collaboration, which we may be unable to do, either of which could have an adverse effect on our business and operations. Moreover, if Astellas or AstraZeneca, or any successor entity, were to determine that their collaborations with us are no longer a strategic priority, or if either of them or a successor were to reduce their level of commitment to their collaborations with us, our ability to develop and commercialize roxadustat could suffer. In addition, our collaborations are exclusive and preclude us from entering into additional collaboration agreements with other parties in the area or field of exclusivity.

If we do not establish and maintain strategic collaborations related to our product candidates, we will bear all of the risk and costs related to the development and commercialization of any such product candidate, and we may need to seek additional financing, hire additional employees and otherwise develop expertise at significant cost. This in turn may negatively affect the development of our other product candidates as we direct resources to our most advanced product candidates.

Our collaboration partners also have certain rights to control decisions regarding the development and commercialization of our product candidates with respect to which they are providing funding. If we have a disagreement over strategy and activities with our collaboration partners, our plans for obtaining regulatory approval may be revised and negatively affect the anticipated timing and potential for success of our product candidates. Even if a product under a collaboration agreement receives regulatory approval, we will remain substantially dependent on the commercialization strategy and efforts of our collaboration partners, and, our collaboration partners have limited or no experience in commercialization of an anemia drug. If our collaboration partners are unsuccessful in their commercialization efforts, our results will be negatively affected.

With respect to our collaboration agreements for roxadustat, there are additional complexities in that our collaboration partners, Astellas and AstraZeneca, and we must reach consensus on our development programs and regulatory activities, including for the NDA in the U.S. and the Marketing Authorization Application in Europe. In addition, there are aspects of commercial operations that require cooperation among the collaboration partners, including safety data reporting. Multi-party decision-making is complex and involves significant time and effort, and there can be no assurance that the parties will cooperate or reach consensus, or that one or both of our partners will not ask to proceed independently in some or all of their respective territories or functional areas of responsibility in which the applicable collaboration partner would otherwise be obligated to cooperate with us. Any disputes or lack of cooperation with us by either Astellas or AstraZeneca, or both, may negatively impact the timing or success of our regulatory approval applications.

We intend to conduct proprietary research programs in specific disease areas that are not covered by our collaboration agreements. Our pursuit of such opportunities could, however, result in conflicts with our collaboration partners in the event that any of our collaboration partners takes the position that our internal activities overlap with those areas that are exclusive to our collaboration agreements. Moreover, disagreements with our collaboration partners could develop over rights to our intellectual property, including the enforcement of those rights. In addition, our collaboration agreements may have provisions that give rise to disputes regarding the rights and obligations of the parties. Any conflict with our collaboration partners could lead to the termination of our collaboration agreements, delay collaborative activities, reduce our ability to renew agreements or obtain future collaboration agreements or result in litigation or arbitration and would negatively impact our relationship with existing collaboration partners, and could impact our commercial results.

Certain of our collaboration partners could also become our competitors in the future. If our collaboration partners develop competing products, fail to obtain necessary regulatory approvals, terminate their agreements with us prematurely or fail to devote sufficient resources to the development and commercialization of our product candidates, the development and commercialization of our product candidates and products could be delayed.

If our preclinical and clinical trial contractors do not properly perform their agreed upon obligations, we may not be able to obtain or may be delayed in receiving regulatory approvals for our product candidates.

We rely heavily on university, hospital, dialysis centers and other institutions and third parties, including the principal investigators and their staff, to carry out our clinical trials in accordance with our clinical protocols and designs. We also rely on a number of third-party CROs to assist in undertaking, managing, monitoring and executing our ongoing clinical trials, including those for roxadustat. We expect to continue to rely on CROs, clinical data management organizations, medical institutions and clinical investigators to conduct our development efforts in the future, including our continued development of roxadustat. We compete with many other companies for the resources of these third parties, and large pharmaceutical companies often have significantly more extensive agreements and relationships with such third-party providers, and such third-party providers may prioritize the requirements of such large pharmaceutical companies over ours. The third parties on whom we rely may terminate their engagements with us at any time, which may cause delay in the development and commercialization of our product candidates. If any such third party terminates its engagement with us or fails to perform as agreed, we may be required to enter into alternative arrangements, which would result in significant cost and delay to our product development program. Moreover, our agreements with such third parties generally do not provide assurances regarding employee turnover and availability, which may cause interruptions in the research on our product candidates by such third parties.

Moreover, while our reliance on these third parties for certain development and management activities will reduce our control over these activities, it will not relieve us of our responsibilities. For example, the FDA and foreign regulatory authorities require compliance with regulations and standards, including GCP requirements for designing, conducting, monitoring, recording, analyzing and reporting the results of clinical trials to ensure that the data and results from trials are credible and accurate and that the rights, integrity and confidentiality of trial participants are protected. Although we rely on third parties to conduct our clinical trials, we, as the sponsor, remain responsible for ensuring that each of these clinical trials is conducted in accordance with its general investigational plan and protocol under legal and regulatory requirements, including GCP. Regulatory authorities enforce these GCP requirements through periodic inspections of trial sponsors, principal investigators and trial sites.

If any of our CROs, trial sites, principal investigators or other third parties fail to comply with applicable GCP requirements, other regulations, trial protocol or other requirements under their agreements with us, the quality or accuracy of the data they obtain may be compromised or unreliable, and the trials of our product candidates may not meet regulatory requirements. If trials do not meet regulatory requirements or if these third parties need to be replaced, the development of our product candidates may be delayed, suspended or terminated, regulatory authorities may require us to exclude the use of patient data from our approval applications or perform additional clinical trials before approving our marketing applications. Regulatory authorities may even reject our application for approval or refuse to accept our future applications for an extended period of time. We cannot assure that upon inspection by a regulatory authority, such regulatory authority will determine that any of our clinical trials comply with GCP requirements or that our results may be used in support of our regulatory submissions. If any of these events occur, we may not be able to obtain regulatory approval for our product candidates on a timely basis, at a reasonable cost, or at all.

We currently rely, and expect to continue to rely, on third parties to conduct many aspects of our product manufacturing and distribution, and these third parties may terminate these agreements or not perform satisfactorily.

We do not have operating manufacturing facilities at this time other than our roxadustat manufacturing facilities in China, and our current commercial manufacturing plans in China are not expected to satisfy the requirements necessary to support development and commercialization outside of China. Other than in and for China specifically, we do not expect to independently manufacture our products. We currently rely, and expect to continue to rely, on third parties to scale-up, manufacture and supply roxadustat and our other product candidates outside of China. We rely on third parties for distribution, including our collaboration partners and their vendors, except in China where we have established a jointly owned entity with AstraZeneca to manage most of the distribution in China. Risks arising from our reliance on third-party manufacturers include:

- reduced control and additional burdens of oversight as a result of using third-party manufacturers and distributors for all aspects of manufacturing activities, including regulatory compliance and quality control and quality assurance;
- termination of manufacturing agreements, termination fees associated with such termination, or nonrenewal of manufacturing agreements with third parties may negatively impact our planned development and commercialization activities;
- the possible misappropriation of our proprietary technology, including our trade secrets and know-how; and
- disruptions to the operations of our third-party manufacturers, distributors or suppliers unrelated to our product, including the merger, acquisition, or bankruptcy of a manufacturer or supplier or a catastrophic event, including disruption resulting from the COVID-19 pandemic, affecting our manufacturers, distributors or suppliers.

Any of these events could lead to development delays or failure to obtain regulatory approval or affect our ability to successfully commercialize our product candidates. Some of these events could be the basis for action by the FDA or another regulatory authority, including injunction, recall, seizure or total or partial suspension of production.

The facilities used by our contract manufacturers to manufacture our product candidates must pass inspections by the FDA and other regulatory authorities. Although, except for China, we do not control the manufacturing operations of, and expect to remain completely dependent on, our contract manufacturers for manufacture of drug substance and finished drug product, we are ultimately responsible for ensuring that our product candidates are manufactured in compliance with cGMP requirements. If our contract manufacturers cannot successfully manufacture material that conforms to our or our collaboration partners' specifications, or the regulatory requirements of the FDA or other regulatory authorities, we may not be able to secure and/or maintain regulatory approval for our product candidates and our development or commercialization plans may be delayed. In addition, we have no control over the ability of our contract manufacturers to maintain adequate quality control, quality assurance and qualified personnel. In addition, although our longer-term agreements are expected to provide for requirements to meet our quantity and quality requirements to manufacture our products candidates for clinical studies and commercial sale, we will have minimal direct control over the ability of our contract manufacturers to maintain adequate quality control, quality assurance and qualified personnel and we expect to rely on our audit rights to ensure that those qualifications are maintained to meet our requirements. If our contract manufacturers' facilities do not pass inspection by regulatory authorities, or if regulatory authorities do not approve these facilities for the manufacture of our products, or withdraw any such approval in the future, we would need to identify and qualify alternative manufacturing facilities, which would significantly impact our ability to develop, obtain regulatory approval for or market our products, if approved. Moreover, any failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed on us or adverse regulatory consequences, including clinical holds, warnings or untitled letters, fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocation, seizures or recalls of product candidates or products, operating restrictions and criminal prosecutions, any of which would be expected to significantly and adversely affect supplies of our products to us and our collaboration partners.

We have entered into a commercial supply agreement for the manufacture of pamrevlumab with Samsung Biologics Co., Ltd. However, we may experience delays or technical problems associated with technology transfer of the manufacturing process to Samsung and the qualification and scale-up thereof. We have made certain manufacturing commitments to Samsung Biologics Co., Ltd., and there is a risk we will not require the quantities of pamrevlumab we have committed to, particularly if we cease some of our pamrevlumab clinical trials. In addition, our product candidates and any products that we may develop may compete with other product candidates and products for access and prioritization to manufacture. Certain third-party manufacturers may be contractually prohibited from manufacturing our product due to non-compete agreements with our competitors or a commitment to grant another party priority relative to our products. There are a limited number of third-party manufacturers that operate under cGMP and that might be capable of manufacturing to meet our requirements. Due to the limited number of third-party manufacturers with the contractual freedom, expertise, required regulatory approvals and facilities to manufacture our products on a commercial scale, identifying and qualifying a replacement third-party manufacturer would be expensive and time-consuming and may cause delay or interruptions in the production of our product candidates or products, which in turn may delay, prevent or impair our development and commercialization efforts.

We have a letter agreement with IRIX Pharmaceuticals, Inc. (“IRIX”), a third-party manufacturer that we have used in the past, pursuant to which we agreed to negotiate a single source manufacturing agreement that included a right of first negotiation for the cGMP manufacture of HIF-PH inhibitors, including roxadustat, provided that IRIX is able to match any third-party bids within 5%. The exclusive right to manufacture extends for five years after approval of an NDA for those compounds, and any agreement would provide that no minimum amounts would be specified until appropriate by forecast and that we and a commercialization partner would have the rights to contract with independent third parties that exceed IRIX’s internal manufacturing capabilities or in the event that we or our commercialization partner determines for reasons of continuity of supply and security that such a need exists, provided that IRIX would supply no less than 65% of the product if it is able to provide this level of supply. Subsequent to the letter agreement, we and IRIX have entered into several additional service agreements. IRIX has requested in writing that we honor the letter agreement with respect to the single source manufacturing agreement, and if we were to enter into any such exclusive manufacturing agreement, there can be no assurance that IRIX will not assert a claim for right to manufacture roxadustat or that IRIX could manufacture roxadustat successfully and in accordance with applicable regulations for a commercial product and the specifications of our collaboration partners. In 2015, Patheon Pharmaceuticals Inc., a business unit of DPx Holdings B.V., acquired IRIX, and in 2017, ThermoFisher Scientific Inc. acquired Patheon Pharmaceuticals Inc.

If any third-party manufacturer terminates its engagement with us or fails to perform as agreed, we may be required to find replacement manufacturers, which would result in significant cost and delay to our development programs. Although we believe that there are several potential alternative manufacturers who could manufacture our product candidates, we may incur significant delays and added costs in identifying, qualifying and contracting with any such third party or potential second source manufacturer. In any event, with any third-party manufacturer we expect to enter into technical transfer agreements and share our know-how with the third-party manufacturer, which can be time-consuming and may result in delays. These delays could result in a suspension or delay of marketing roxadustat.

Certain components of our products are acquired from single-source suppliers or without long-term supply agreements. The loss of these suppliers, or their failure to supply, would materially and adversely affect our business.

We do not have an alternative supplier of certain components of our product candidates. We may be unable to enter into long-term commercial supply arrangements for some of our products, or do so on commercially reasonable terms, which could have a material adverse impact upon our business. In addition, we currently rely on our contract manufacturers to purchase from third-party suppliers some of the materials necessary to produce our product candidates. We do not have direct control over the acquisition of those materials by our contract manufacturers.

The logistics of our supply chain, which include shipment of materials and intermediates from countries such as China and India add additional time and risk (including risk of loss) to the manufacture of our product candidates. While we have in the past maintained sufficient inventory of materials, active pharmaceutical ingredients (“API”), and drug product to meet our and our collaboration partners’ needs for roxadustat to date, the lead-time and regulatory approvals required to source from and into countries outside of the U.S. increase the risk of delay and potential shortages of supply.

Risks Related to Our Intellectual Property

If our efforts to protect our proprietary technologies are not adequate, we may not be able to compete effectively in our market.

We rely upon a combination of patents, trade secret protection, and contractual arrangements to protect the intellectual property related to our technologies. We will only be able to protect our products and proprietary information and technology by preventing unauthorized use by third parties to the extent that our patents, trade secrets, and contractual position allow us to do so. Any disclosure to or misappropriation by third parties of our trade secrets or confidential information could compromise our competitive position. Moreover, we are involved in, have in the past been involved in, and may in the future be involved in legal proceedings involving our intellectual property initiated by third parties, which proceedings can be associated with significant costs and commitment of management time and attention. As our product candidates continue in development, third parties have attempted and may again attempt to challenge the validity and enforceability of our patents and proprietary information and technologies.

We also are involved in, have in the past been involved in, and may in the future be involved in initiating legal or administrative proceedings involving the product candidates and intellectual property of our competitors. These proceedings can result in significant costs and commitment of management time and attention, and there can be no assurance that our efforts would be successful in preventing or limiting the ability of our competitors to market competing products.

Composition-of-matter patents relating to the API are generally considered to be the strongest form of intellectual property protection for pharmaceutical products, as such patents provide protection not limited to any one method of use. Method-of-use patents protect the use of a product for the specified method(s), and do not prevent a competitor from making and marketing a product that is identical to our product for an indication that is outside the scope of the patented method. We rely on a combination of these and other types of patents to protect our product candidates, and there can be no assurance that our intellectual property will create and sustain the competitive position of our product candidates.

Biotechnology and pharmaceutical product patents involve highly complex legal and scientific questions and can be uncertain. Any patent applications that we own or license may fail to result in issued patents. Even if patents do successfully issue from our applications, third parties may challenge their validity or enforceability, which may result in such patents being narrowed, invalidated, or held unenforceable. Even if our patents and patent applications are not challenged by third parties, those patents and patent applications may not prevent others from designing around our claims and may not otherwise adequately protect our product candidates. If the breadth or strength of protection provided by the patents and patent applications we hold with respect to our product candidates is threatened, competitors with significantly greater resources could threaten our ability to commercialize our product candidates. Discoveries are generally published in the scientific literature well after their actual development, and patent applications in the U.S. and other countries are typically not published until 18 months after their filing, and in some cases are never published. Therefore, we cannot be certain that we or our licensors were the first to make the inventions claimed in our owned and licensed patents or patent applications, or that we or our licensors were the first to file for patent protection covering such inventions. Subject to meeting other requirements for patentability, for U.S. patent applications filed prior to March 16, 2013, the first to invent the claimed invention is entitled to receive patent protection for that invention while, outside the U.S., the first to file a patent application encompassing the invention is entitled to patent protection for the invention. The U.S. moved to a “first to file” system under the Leahy-Smith America Invents Act, effective March 16, 2013. This system also includes procedures for challenging issued patents and pending patent applications, which creates additional uncertainty. We have, are, and may again become involved in opposition or interference proceedings challenging our patents and patent applications or the patents and patent applications of others, and the outcome of any such proceedings are highly uncertain. An unfavorable outcome in any such proceedings could reduce the scope of or invalidate our patent rights, allow third parties to commercialize our technology and compete directly with us, or result in our inability to manufacture, develop or commercialize our product candidates without infringing the patent rights of others.

In addition to the protection afforded by patents, we seek to rely on trade secret protection and confidentiality agreements to protect proprietary know-how, information, or technology that is not covered by our patents. Although our agreements require all of our employees to acknowledge ownership by us of inventions conceived as a result of employment from the point of conception and, to the extent necessary, perfect such ownership by assignment, and we require all of our employees, consultants, advisors and any third parties who have access to our trade secrets, proprietary know-how and other confidential information and technology to enter into appropriate confidentiality agreements, we cannot be certain that our trade secrets, proprietary know-how and other confidential information and technology will not be subject to unauthorized disclosure or that our competitors will not otherwise gain access to or independently develop substantially equivalent trade secrets, proprietary know-how and other information and technology. Furthermore, the laws of some foreign countries, in particular, China, where we have operations, do not protect proprietary rights to the same extent or in the same manner as the laws of the U.S. As a result, we may encounter significant problems in protecting and defending our intellectual property globally. If we are unable to prevent unauthorized disclosure of our intellectual property related to our product candidates and technology to third parties, we may not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business and operations.

Intellectual property disputes may be costly, time consuming, and may negatively affect our competitive position.

Our commercial success may depend on our avoiding infringement of the patents and other proprietary rights of third parties as well as on enforcing our patents and other proprietary rights against third parties. Pharmaceutical and biotechnology intellectual property disputes are characterized by complex, lengthy and expensive litigation over patents and other intellectual property rights. We have initiated and may again initiate or become party to or be threatened with future litigation or other proceedings regarding intellectual property rights with respect to our product candidates and competing products.

As our product candidates progress toward commercialization, our collaboration partners or we may be subject to patent infringement claims from third parties. We attempt to ensure that our product candidates do not infringe third-party patents and other proprietary rights. However, the patent landscape in competitive product areas is highly complex, and there may be patents of third parties of which we are unaware that may result in claims of infringement. Accordingly, there can be no assurance that our product candidates do not infringe proprietary rights of third parties, and parties making claims against us may seek and obtain injunctive or other equitable relief, which could potentially block further efforts to develop and commercialize our product candidates including roxadustat or pamrevlumab. Any litigation involving defense against claims of infringement, regardless of the merit of such claims, would involve substantial litigation expense and would be a substantial diversion of management time.

We may consider administrative proceedings and other means for challenging third-party patents and patent applications. An unfavorable outcome in any such challenge could require us to cease using the related technology and to attempt to license rights to it from the prevailing third party, which may not be available on commercially reasonable terms, if at all, in which case our business could be harmed.

We intend, if necessary, to vigorously enforce our intellectual property in order to protect the proprietary position of our product candidates, including roxadustat and pamrevlumab. In addition, our collaboration partners who have been granted licenses to our patents may also have rights related to enforcement of those patents. Active efforts to enforce our patents by us or by our partners may include litigation, administrative proceedings, or both, depending on the potential benefits that might be available from those actions and the costs associated with undertaking those efforts against third parties. We carefully review and monitor publicly available information regarding products that may be competitive with our product candidates and assert our intellectual property rights where appropriate.

Third parties have challenged and may again challenge our patents and patent applications, through interference, reexamination, *inter partes* review, and post-grant review proceedings before the U.S. Patent and Trademark Office (“USPTO”) or through comparable proceedings in other territories. For example, various legal challenges against our HIF anemia-related technologies patent portfolio have been filed in several territories including in Europe, the United Kingdom, Canada, and Japan,. Regardless of the final outcome of these actions, the potential narrowing or revocation of any of the HIF anemia-related technology patents does not affect our exclusivity for roxadustat or our freedom-to-operate with respect to use of roxadustat for the treatment of anemia in these or other territories. A settlement has been reached in the litigation in Canada, resulting in the discontinuance of the action and leaving FibroGen’s Canadian patents valid and enforceable.

In April 2020, in response to an invalidation action brought against certain of our United Kingdom patents by Akebia, the United Kingdom court handed down a decision invalidating United Kingdom designations of European Patent Nos. 1463823, 1633333, 2298301, 2322153, and 2322155. The United Kingdom designation to European Patent No. 2289531 was held to be valid in amended form, but not infringed by Akebia. We and our partner Astellas have filed an appeal of the decision in the United Kingdom Court of Appeal.

In May 2020, oppositions were filed against our European Patent No. 2872488 (the "`488 Patent"), which claims a crystalline form of roxadustat, and against our European Patent No. 3003284 (the "`284 Patent"), which claims photostable formulations of roxadustat. Final resolution of the opposition proceedings will take time, and we cannot be assured of the breadth of the claims that will remain in the `488 Patent or `284 Patent, or that either or both of the patents will not be revoked in their entirety.

Furthermore, there is a risk that any public announcements concerning the status or outcomes of intellectual property litigation or administrative proceedings may adversely affect the price of our stock. If securities analysts or our investors interpret such status or outcomes as negative or otherwise creating uncertainty, our common stock price may be adversely affected.

Our reliance on third parties and agreements with collaboration partners requires us to share our trade secrets, which increases the possibility that a competitor may discover them or that our trade secrets will be misappropriated or disclosed.

Our reliance on third-party contractors to develop and manufacture our product candidates is based upon agreements that limit the rights of the third parties to use or disclose our confidential information, including our trade secrets and know-how. Despite the contractual provisions, the need to share trade secrets and other confidential information increases the risk that such trade secrets and information are disclosed or used, even if unintentionally, in violation of these agreements. In the highly competitive markets in which our product candidates are expected to compete, protecting our trade secrets, including our strategies for addressing competing products, is imperative, and any unauthorized use or disclosure could impair our competitive position and may have a material adverse effect on our business and operations.

In addition, our collaboration partners are larger, more complex organizations than ours, and the risk of inadvertent disclosure of our proprietary information may be increased despite their internal procedures and contractual obligations that we have in place with them. Despite our efforts to protect our trade secrets and other confidential information, a competitor's discovery of such trade secrets and information could impair our competitive position and have an adverse impact on our business.

The cost of maintaining our patent protection is high and requires continuous review and diligence. We may not be able to effectively maintain our intellectual property position throughout the major markets of the world.

The USPTO and foreign patent authorities require maintenance fees and payments as well as continued compliance with a number of procedural and documentary requirements. Noncompliance may result in abandonment or lapse of the subject patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance may result in reduced royalty payments for lack of patent coverage in a particular jurisdiction from our collaboration partners or may result in competition, either of which could have a material adverse effect on our business.

We have made, and will continue to make, certain strategic decisions in balancing costs and the potential protection afforded by the patent laws of certain countries. As a result, we may not be able to prevent third parties from practicing our inventions in all countries throughout the world, or from selling or importing products made using our inventions in and into the U.S. or other countries. Third parties may use our technologies in territories in which we have not obtained patent protection to develop their own products and, further, may infringe our patents in territories which provide inadequate enforcement mechanisms, even if we have patent protection. Such third-party products may compete with our product candidates, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

The laws of some foreign countries do not protect proprietary rights to the same extent as do the laws of the U.S., and we may encounter significant problems in securing and defending our intellectual property rights outside the U.S.

Many companies have encountered significant problems in protecting and defending intellectual property rights in certain countries. The legal systems of certain countries do not always favor the enforcement of patents, trade secrets, and other intellectual property rights, particularly those relating to pharmaceutical and biotechnology products, which could make it difficult for us to stop infringement of our patents, misappropriation of our trade secrets, or marketing of competing products in violation of our proprietary rights. In China, our intended establishment of significant operations will depend in substantial part on our ability to effectively enforce our intellectual property rights in that country. Proceedings to enforce our intellectual property rights in foreign countries could result in substantial costs and divert our efforts and attention from other aspects of our business, and could put our patents in these territories at risk of being invalidated or interpreted narrowly, or our patent applications at risk of not being granted, and could provoke third parties to assert claims against us. We may not prevail in all legal or other proceedings that we may initiate and, if we were to prevail, the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

Intellectual property rights do not address all potential threats to any competitive advantage we may have.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and intellectual property rights may not adequately protect our business or permit us to maintain our competitive advantage. The following examples are illustrative:

- Others may be able to make compounds that are the same as or similar to our current or future product candidates but that are not covered by the claims of the patents that we own or have exclusively licensed.
- We or any of our licensors or strategic partners might not have been the first to make the inventions covered by the issued patent or pending patent application that we own or have exclusively licensed.
- We or any of our licensors or strategic partners might not have been the first to file patent applications covering certain of our inventions.
- Others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our intellectual property rights.
- The prosecution of our pending patent applications may not result in granted patents.
- Granted patents that we own or have exclusively licensed may not provide us with any competitive advantages, or may be held invalid or unenforceable, as a result of legal challenges by our competitors.
- Patent protection on our product candidates may expire before we are able to develop and commercialize the product, or before we are able to recover our investment in the product.
- Our competitors might conduct research and development activities in the U.S. and other countries that provide a safe harbor from patent infringement claims for such activities, as well as in countries in which we do not have patent rights, and may then use the information learned from such activities to develop competitive products for sale in markets where we intend to market our product candidates.

The existence of counterfeit pharmaceutical products in pharmaceutical markets may compromise our brand and reputation and have a material adverse effect on our business, operations and prospects.

Counterfeit products, including counterfeit pharmaceutical products, are a significant problem, particularly in China. Counterfeit pharmaceuticals are products sold or used for research under the same or similar names, or similar mechanism of action or product class, but which are sold without proper licenses or approvals, and are often lower cost, lower quality, different potency, or have different ingredients or formulations, and have the potential to damage the reputation for quality and effectiveness of the genuine product. Such products may be used for indications or purposes that are not recommended or approved or for which there is no data or inadequate data with regard to safety or efficacy. Such products divert sales from genuine products. If counterfeit pharmaceuticals illegally sold or used for research result in adverse events or side effects to consumers, we may be associated with any negative publicity resulting from such incidents. Consumers may buy counterfeit pharmaceuticals that are in direct competition with our pharmaceuticals, which could have an adverse impact on our revenues, business and results of operations. In addition, the use of counterfeit products could be used in non-clinical or clinical studies, or could otherwise produce undesirable side effects or adverse events that may be attributed to our products as well, which could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in the delay or denial of regulatory approval by the FDA or other regulatory authorities and potential product liability claims. With respect to China, although the government has recently been increasingly active in policing counterfeit pharmaceuticals, there is not yet an effective counterfeit pharmaceutical regulation control and enforcement system in China. As a result, we may not be able to prevent third parties from selling or purporting to sell our products in China. The proliferation of counterfeit pharmaceuticals has grown in recent years and may continue to grow in the future. The existence of and any increase in the sales and production of counterfeit pharmaceuticals, or the technological capabilities of counterfeiters, could negatively impact our revenues, brand reputation, business and results of operations.

Risks Related to Government Regulation

The regulatory approval process is highly uncertain and we may not obtain regulatory approval for our product candidates.

The time required to obtain approval by the FDA and comparable foreign regulatory authorities is unpredictable, but typically takes many years following the commencement of preclinical studies and clinical trials and depends upon numerous factors, including the substantial discretion of the regulatory authorities. In addition, approval policies, regulations, or the type and amount of clinical data necessary to gain approval may change during the course of a product candidate's clinical development and may vary among jurisdictions. Except for roxadustat in China, Japan, and Chile for patients on dialysis and not on dialysis, we have not obtained regulatory approval for any product candidate, and it is possible that neither roxadustat nor pamrevlumab, nor any future product candidates we may discover, in-license or acquire and seek to develop in the future, will obtain regulatory approval in additional countries.

Our product candidates could fail to receive regulatory approval from the FDA or other regulatory authorities for many reasons, including:

- disagreement over the design or implementation of our clinical trials;
- failure to demonstrate that a product candidate is safe and effective for its proposed indication;
- failure of clinical trials to meet the level of statistical significance required for approval;
- failure to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;
- disagreement over our interpretation of data from preclinical studies or clinical trials;
- disagreement over whether to accept efficacy results from clinical trial sites outside the U.S. where the standard of care is potentially different from that in the U.S.;
- the insufficiency of data collected from clinical trials of our present or future product candidates to support the submission and filing of an NDA or other submission or to obtain regulatory approval;
- disapproval of the manufacturing processes or facilities of either our manufacturing plant or third party manufacturers with whom we contract for clinical and commercial supplies; or
- changes in the approval policies or regulations that render our preclinical and clinical data insufficient for approval.

The FDA or other regulatory authorities may require more information, including additional preclinical or clinical data to support approval, or different analyses, which may delay or prevent approval and our commercialization plans, or we may decide to abandon the development program altogether. Even if we do obtain regulatory approval, our product candidates may be approved for fewer or more limited indications than we request, approval may be contingent on the performance of costly post-marketing clinical trials, or approval may require labeling that does not include the labeling claims necessary or desirable for the successful commercialization of that product candidate. In addition, if our product candidates produce undesirable side effects or safety issues, the FDA may require the establishment of REMS or other regulatory authorities may require the establishment of a similar strategy, that may restrict distribution of our approved products, if any, and impose burdensome implementation requirements on us. Any of the foregoing scenarios could materially harm the commercial prospects for our product candidates.

Even if we believe our clinical trials are successful, regulatory authorities may not agree that our completed clinical trials provide adequate data on safety or efficacy. Approval by one regulatory authority does not ensure approval by any other regulatory authority. However, a failure or delay in obtaining regulatory approval in one country may have a negative effect on the regulatory process in others. We may not be able to file for regulatory approvals and even if we file we may not receive the necessary approvals to commercialize our product candidates in any market.

Our current and future relationships with customers, physicians, and third-party payors are subject to healthcare fraud and abuse laws, false claims laws, transparency laws, privacy and security laws, and other regulations. If we are unable to comply with such laws, we could face substantial penalties.

Our current and future relationships with customers, physicians, and third-party payors are subject to health care laws and regulations, which may constrain the business or financial arrangements and relationships through which we research, as well as, sell, market and distribute any products for which we obtain marketing approval. If we obtain approval in the U.S. for any of our product candidates, the regulatory requirements applicable to our operations, in particular our sales and marketing efforts, will increase significantly with respect to our operations and the potential for administrative, civil and criminal enforcement by the federal government and the states and foreign governments will increase with respect to the conduct of our business. The laws that may affect our operations in the U.S. include:

- the federal Anti-Kickback Statute, which prohibits, among other things, persons from knowingly and willfully soliciting, receiving, offering or paying remuneration, directly or indirectly, to induce, or in return for, the purchase or recommendation of an item or service reimbursable under a federal healthcare program, such as the Medicare and Medicaid programs;
- federal civil and criminal false claims laws and civil monetary penalty laws, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, claims for payment from Medicare, Medicaid, or other third-party payors that are false or fraudulent;
- the Health Insurance Portability and Accountability Act of 1996 (“HIPAA”), which created new federal criminal statutes that prohibit executing a scheme to defraud any healthcare benefit program and making false statements relating to healthcare matters;
- HIPAA, as amended by Health Information Technology and Clinical Health Act, and its implementing regulations, which imposes certain requirements on certain covered healthcare providers, health plans, and healthcare clearinghouses as well as their respective business associates that perform services for them that involve the use, or disclosure of, individually identifiable health information as well as their covered subcontractors relating to the privacy, security, and transmission of individually identifiable health information;
- the federal physician sunshine requirements under the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010 (collectively, the “PPACA”), which requires manufacturers of drugs, devices, biologics, and medical supplies to report annually to the Centers for Medicare & Medicaid Services (“CMS”), information related to payments and other transfers of value to physicians, other healthcare providers, and teaching hospitals, and ownership and investment interests held by physicians and other healthcare providers and their immediate family members;

- foreign and state law equivalents of each of the above federal laws, such as the U.S. Foreign Corrupt Practices Act ("FCPA"), anti-kickback and false claims laws that may apply to items or services reimbursed by any third-party payor, including commercial insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the applicable compliance guidance promulgated by the federal government, or otherwise restrict payments that may be made to healthcare providers and other potential referral sources; state laws that require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures; and state laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways, thus complicating compliance efforts; and
- the Trade Agreements Act ("TAA"), which requires that drugs sold to the U.S. Government must be manufactured in the U.S. or in TAA approved and designated countries. Drugs manufactured in countries not approved under the TAA, may not be sold to the U.S. without specific regulatory approval. We have little experience with this regulation and there is a risk that drugs made from Chinese-made API may not be sold to an entity of the U.S. such as the Veterans Health Administration ("VA") due to our inability to obtain regulatory approval. While there have been recent VA policy changes that appear to allow for sale of drugs from non-TAA approved countries, this policy may change or there may be additional policies or legislation that affect our ability to sell drug to the U.S. Government.

The scope of these laws and our lack of experience in establishing the compliance programs necessary to comply with this complex and evolving regulatory environment increases the risks that we may unknowingly violate the applicable laws and regulations. If our operations are found to be in violation of any of such laws or any other governmental regulations that apply to us, we may be subject to significant penalties, including administrative, civil and criminal penalties, damages, fines, disgorgement, the curtailment or restructuring of our operations, the exclusion from participation in federal and state healthcare programs and imprisonment, any of which could materially adversely affect our ability to operate our business and our financial results.

Even if resolved in our favor, litigation or other legal proceedings relating to healthcare laws and regulations may cause us to incur significant expenses and could distract our technical and management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common shares. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development, manufacturing, sales, marketing or distribution activities. Uncertainties resulting from the initiation and continuation of litigation or other proceedings relating to applicable healthcare laws and regulations could have a material adverse effect on our ability to compete in the marketplace.

We are subject to laws and regulations governing corruption, which will require us to maintain costly compliance programs.

We must comply with a wide range of laws and regulations to prevent corruption, bribery, and other unethical business practices, including the FCPA, anti-bribery and anti-corruption laws in other countries, particularly China. The implementation and maintenance of compliance programs is costly and such programs may be difficult to enforce, particularly where reliance on third parties is required.

Anti-bribery laws prohibit us, our employees, and some of our agents or representatives from offering or providing any personal benefit to covered government officials to influence their performance of their duties or induce them to serve interests other than the missions of the public organizations in which they serve. Certain commercial bribery rules also prohibit offering or providing any personal benefit to employees and representatives of commercial companies to influence their performance of their duties or induce them to serve interests other than their employers. The FCPA also obligates companies whose securities are listed in the U.S. to comply with certain accounting provisions requiring us to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and devise and maintain an adequate system of internal accounting controls for international operations. The anti-bribery provisions of the FCPA are enforced primarily by the Department of Justice. The SEC is involved with enforcement of the books and records provisions of the FCPA.

Compliance with these anti-bribery laws is expensive and difficult, particularly in countries in which corruption is a recognized problem. In addition, the anti-bribery laws present particular challenges in the pharmaceutical industry because in many countries including China, hospitals are state-owned or operated by the government, and doctors and other hospital employees are considered foreign government officials. Furthermore, in certain countries (China in particular), hospitals and clinics are permitted to sell pharmaceuticals to their patients and are primary or significant distributors of pharmaceuticals. Certain payments to hospitals in connection with clinical studies, procurement of pharmaceuticals and other work have been deemed to be improper payments to government officials that have led to vigorous anti-bribery law enforcement actions and heavy fines in multiple jurisdictions, particularly in the U.S. and China.

It is not always possible to identify and deter violations, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations.

In the pharmaceutical industry, corrupt practices include, among others, acceptance of kickbacks, bribes or other illegal gains or benefits by the hospitals and medical practitioners from pharmaceutical manufacturers, distributors or their third-party agents in connection with the prescription of certain pharmaceuticals. If our employees, affiliates, distributors or third-party marketing firms violate these laws or otherwise engage in illegal practices with respect to their sales or marketing of our products or other activities involving our products, we could be required to pay damages or heavy fines by multiple jurisdictions where we operate, which could materially and adversely affect our financial condition and results of operations. The Chinese government has also sponsored anti-corruption campaigns from time to time, which could have a chilling effect on any future marketing efforts by us to new hospital customers. There have been recent occurrences in which certain hospitals have denied access to sales representatives from pharmaceutical companies because the hospitals wanted to avoid the perception of corruption. If this attitude becomes widespread among our potential customers, our ability to promote our products to hospitals may be adversely affected.

As we expand our operations in China and other jurisdictions internationally, we will need to increase the scope of our compliance programs to address the risks relating to the potential for violations of the FCPA and other anti-bribery and anti-corruption laws. Our compliance programs will need to include policies addressing not only the FCPA, but also the provisions of a variety of anti-bribery and anti-corruption laws in multiple foreign jurisdictions, including China, provisions relating to books and records that apply to us as a public company, and include effective training for our personnel throughout our organization. The creation and implementation of anti-corruption compliance programs is costly and such programs are difficult to enforce, particularly where reliance on third parties is required. Violation of the FCPA and other anti-corruption laws can result in significant administrative and criminal penalties for us and our employees, including substantial fines, suspension or debarment from government contracting, prison sentences, or even the death penalty in extremely serious cases in certain countries. The SEC also may suspend or bar us from trading securities on U.S. exchanges for violation of the FCPA's accounting provisions. Even if we are not ultimately punished by government authorities, the costs of investigation and review, distraction of our personnel, legal defense costs, and harm to our reputation could be substantial and could limit our profitability or our ability to develop or commercialize our product candidates. In addition, if any of our competitors are not subject to the FCPA, they may engage in practices that will lead to their receipt of preferential treatment from foreign hospitals and enable them to secure business from foreign hospitals in ways that are unavailable to us.

We have identified material weaknesses in our internal control over financial reporting. If we are unable to remediate these, or if we otherwise fail to maintain an effective system of internal control, it may result in material misstatements in our financial statements.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting and for evaluating and reporting on the effectiveness of our system of internal control. Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external reporting purposes in accordance with generally accepted accounting principles. As a public company, we are required to comply with the Sarbanes-Oxley Act and other rules that govern public companies.

As of September 30, 2020, we have identified a material weakness in the risk assessment component of internal control as we did not appropriately design and maintain an effective risk assessment process at a precise enough level to identify new and evolving risks of material misstatement to the financial statements as a result of changes in our business operation. This material weakness gave rise to the following additional control deficiencies, which we also determined to be material weaknesses. We did not design and maintain effective controls related to the timely identification of shipments associated with drug product revenue and we did not design and maintain effective controls related to the timely identification of changes in estimated variable consideration related to drug product revenue. Each of these material weaknesses could result in material misstatements in the drug product revenue, contract asset, or contract liability account balances or disclosures in our annual or interim consolidated financial statements that would not be prevented or detected. The material weaknesses described above did not result in any material misstatements of our consolidated financial statements or disclosures, but did result in immaterial out-of-period adjustments to drug product revenue related to pre-commercial shipments of drug product, contract assets and contract liabilities, and related financial statement disclosures during the quarter ended September 30, 2020.

We have developed a detailed remediation plan and are making progress to improve our related internal control over financial reporting. For further discussion of the material weaknesses identified and our remedial efforts, see Part II, Item 9A, *"Controls and Procedures"* in this Annual Report on Form 10-K.

Remediation efforts place a significant burden on management and add increased pressure on our financial resources and processes. If we are unable to successfully remediate our existing or any future material weaknesses or other deficiencies in our internal control over financial reporting, the accuracy and timing of our financial reporting may be adversely affected, our liquidity, our access to capital markets may be adversely affected, we may be unable to maintain or regain compliance with applicable securities laws, and the NASDAQ Stock Market LLC listing requirements, we may be subject to regulatory investigations and penalties, investors may lose confidence in our financial reporting, and our stock price may decline.

The impact of recent U.S. healthcare reform, its potential partial or full repeal, and other changes in the healthcare industry and in healthcare spending is currently unknown, and may adversely affect our business model.

The commercial potential for our approved products could be affected by changes in healthcare spending and policy in the U.S. and abroad. We operate in a highly regulated industry and new laws, regulations or judicial decisions, or new interpretations of existing laws, regulations or decisions, related to healthcare availability, the method of delivery or payment for healthcare products and services could negatively impact our business, operations and financial condition.

In the U.S., the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 ("MMA") altered Medicare coverage and payments for pharmaceutical products. The legislation expanded Medicare coverage for drug purchases by the elderly and introduced a new reimbursement methodology based on average sales prices for physician-administered drugs. The MMA also provided authority for limiting the number of drugs that will be covered in any therapeutic class and as a result, we expect that there will be additional pressure to reduce costs. For example, the CMS in implementing the MMA has enacted regulations that reduced capitated payments to dialysis providers. These cost reduction initiatives and other provisions of the MMA could decrease the scope of coverage and the price that may be received for any approved dialysis products and could seriously harm our business and financial condition. While the MMA applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policies and payment limitations in setting their own reimbursement rates, and any reduction in reimbursement that results from the MMA may cause a similar reduction in payments from private payors. Similar regulations or reimbursement policies have been enacted in many international markets that could similarly impact the commercial potential for our products.

Under the Medicare Improvements for Patients and Providers Act ("MIPPA"), a basic case-mix adjusted composite, or bundled, payment system commenced in January 2011 and transitioned fully by January 2014 to a single reimbursement rate for drugs and all services furnished by renal dialysis centers for Medicare beneficiaries with end-stage renal disease. Specifically, under MIPPA the End-Stage Renal Disease Prospective Payment System (the "ESRD PPS") bundle now covers drugs, services, lab tests and supplies under a single treatment base rate for reimbursement by the CMS based on the average cost per treatment, including the cost of ESAs and IV iron doses, typically without adjustment for usage. It is unknown whether roxadustat, if approved in the U.S., will be included in the payment bundle or the timing of inclusion. Under MIPPA, agents that have no IV equivalent in the bundle are currently expected to be excluded from the bundle until 2025. If roxadustat were included in the bundle, it may reduce the price that could be charged for roxadustat, and therefore potentially limit our profitability. Based on roxadustat's differentiated mechanism of action and therapeutic effects, and discussions with our collaboration partner, we currently believe that roxadustat might not initially be included in the bundle and would instead be eligible for a Transitional Drug Add-on Payment Adjustment ("TDAPA") for a 24-month period. At the 24-month mark, CMS would determine if the TDAPA period should be extended for roxadustat or ended. When the TDAPA period ends, CMS will determine if roxadustat should be included in the bundle and, if so, what changes to the ESRD PPS reimbursement should be made. If roxadustat is included in the ESRD PPS bundle, it may have an impact on roxadustat pricing within Dialysis Organizations. If roxadustat is not included in the bundle after the TDAPA period, and would therefore be reimbursed outside of the bundle, it may potentially limit further market penetration of roxadustat. We currently expect roxadustat to be granted TDAPA designation either July 1 or October 1 of 2021. However, there is a risk that we do not receive TDAPA designation, or when we expect it, in which case, there would be a significant impact on roxadustat revenue in 2021, or until TDAPA designation is granted.

In March 2010, the PPACA was passed, which substantially changed the way healthcare is financed by both governmental and private payors in the U.S. There remain judicial and Congressional challenges to certain aspects of the PPACA. For example, the Tax Cuts and Jobs Act of 2017, (the "Tax Act"), was enacted, which includes a provision that repealed, effective January 1, 2019, the tax-based shared responsibility payment imposed by the PPACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate." In addition, the 2020 federal spending package permanently eliminates, effective January 1, 2020, the PPACA-mandated "Cadillac" tax on high-cost employer-sponsored health coverage and medical device tax and, effective January 1, 2021, also eliminated the health insurer tax. Additionally, on December 14, 2018, a Texas U.S. District Court Judge ruled that the PPACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. Additionally, on December 18, 2019, the U.S. Court of Appeals for the 5th Circuit upheld the District Court ruling that the individual mandate was unconstitutional and remanded the case back to the District Court to determine whether the remaining provisions of the PPACA are invalid as well. The U.S. Supreme Court is currently reviewing this case, but it is unknown when a decision will be reached. Although the U.S. Supreme Court has yet ruled on the constitutionality of the PPACA, on January 28, 2021, President Biden issued an executive order to initiate a special enrollment period from February 15, 2021 through May 15, 2021 for purposes of obtaining health insurance coverage through the PPACA marketplace. The executive order also instructs certain governmental agencies to review and reconsider their existing policies and rules that limit access to healthcare, including among others, reexamining Medicaid demonstration projects and waiver programs that include work requirements, and policies that create unnecessary barriers to obtaining access to health insurance coverage through Medicaid or the PPACA. It is unclear how the U.S. Supreme Court ruling, other such litigation, and the healthcare reform measures of the Biden administration will impact the PPACA and our business.

Further, in the U.S. there has been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products, which has resulted in several Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under government payor programs, and review the relationship between pricing and manufacturer patient programs. At the federal level, the Trump administration used several means to propose or implement drug pricing reform, including through federal budget proposals, executive orders and policy initiatives. For example, on July 24, 2020 and September 13, 2020, the Trump administration announced several executive orders related to prescription drug pricing that attempt to implement several of the administration's proposals. The FDA also released a final rule, effective November 30, 2020, implementing a portion of the importation executive order providing guidance for states to build and submit importation plans for drugs from Canada. Further, on November 20, 2020, HHS finalized a regulation removing safe harbor protection for price reductions from pharmaceutical manufacturers to plan sponsors under Part D, either directly or through pharmacy benefit managers, unless the price reduction is required by law. The implementation of the rule has been delayed by the Biden administration from January 1, 2022 to January 1, 2023 in response to ongoing litigation. The rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a new safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers, the implementation of which have also been delayed pending review by the Biden administration until March 22, 2021. On November 20, 2020, CMS issued an interim final rule implementing President Trump's Most Favored Nation executive order, which would tie Medicare Part B payments for certain physician-administered drugs to the lowest price paid in other economically advanced countries, effective January 1, 2021. On December 28, 2020, the U.S. District Court in Northern California issued a nationwide preliminary injunction against implementation of the interim final rule. However, it is unclear whether the Biden administration will work to reverse these measures or pursue similar policy initiatives. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. We expect that additional U.S. healthcare reform measures will be adopted in the future, any of which could limit the amounts that the U.S. federal government will pay for healthcare products and services, which could result in reduced demand for any future products or additional pricing pressures.

Roxadustat is considered a Class 2 substance on the 2019 World Anti-Doping Agency Prohibited List that could limit sales and increase security and distribution costs for our partners and us.

Roxadustat is considered a Class 2 substance on the World Anti-Doping Agency Prohibited List. There are enhanced security and distribution procedures we and our collaboration partners and third-party contractors will have to take to limit the risk of loss of product in the supply chain. As a result, our distribution, manufacturing and sales costs for roxadustat, as well as for our partners, will be increased which will reduce profitability. In addition, there is a risk of reduced sales due to patient access to this drug.

Our employees may engage in misconduct or improper activities, which could result in significant liability or harm our reputation.

We are exposed to the risk of employee fraud or other misconduct, including intentional failure to:

- comply with FDA regulations or similar regulations of comparable foreign regulatory authorities;
- provide accurate information to the FDA or comparable foreign regulatory authorities;
- comply with manufacturing standards we have established;
- comply with privacy laws protecting personal information;
- comply with federal and state healthcare fraud and abuse laws and regulations and similar laws and regulations established and enforced by comparable foreign regulatory authorities;
- comply with the FCPA and other anti-bribery laws;
- report financial information or data accurately; or
- disclose unauthorized activities to us.

Employee misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions, delays in clinical trials, or serious harm to our reputation. We have adopted a code of conduct for our directors, officers and employees, but it is not always possible to identify and deter employee misconduct. The precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could harm our business, results of operations, financial condition and cash flows, including through the imposition of significant fines or other sanctions.

If we fail to comply with environmental, health or safety laws and regulations, we could incur fines, penalties or other costs.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and biological materials. Our operations also produce hazardous waste products. We contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties for failure to comply with such laws and regulations. We do not maintain insurance for environmental liability or toxic tort claims that may be asserted against us in connection with our storage or disposal of biological, hazardous or radioactive materials.

In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations applicable to our operations in the U.S. and foreign countries. These current or future laws and regulations may impair our research, development or manufacturing efforts. Our failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

Risks Related to Our International Operations

We have established operations in China and are seeking approval to commercialize our product candidates outside of the U.S., and a number of risks associated with international operations could materially and adversely affect our business.

We expect to be subject to a number of risks related with our international operations, many of which may be beyond our control. These risks include:

- different regulatory requirements for drug approvals in different countries;
- different standards of care in various countries that could complicate the evaluation of our product candidates;
- different U.S. and foreign drug import and export rules;
- reduced protection for intellectual property rights in certain countries;
- changes in tariffs, trade barriers and regulatory requirements;
- different reimbursement systems and different competitive drugs indicated to treat the indications for which our product candidates are being developed;
- economic weakness, including inflation, or political instability in particular foreign economies and markets;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- compliance with the FCPA, and other anti-corruption and anti-bribery laws;
- U.S. and foreign taxes, including income, excise, customs, consumption, withholding, and payroll taxes;
- foreign currency fluctuations, which could result in increased operating costs and expenses and reduced revenues, and other obligations incident to doing business in another country;
- workforce uncertainty in countries where labor unrest is more common than in the U.S.;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad;

- a reliance on CROs, clinical trial sites, principal investigators and other third parties that may be less experienced with clinical trials or have different methods of performing such clinical trials than we are used to in the U.S.;
- potential liability resulting from development work conducted by foreign distributors; and
- business interruptions resulting from geopolitical actions specific to an international region, including war and terrorism, or natural disasters, including the differing impact of the COVID-19 pandemic on each region.

The pharmaceutical industry in China is highly regulated and such regulations are subject to change.

The pharmaceutical industry in China is subject to comprehensive government regulation and supervision, encompassing the approval, registration, manufacturing, packaging, licensing and marketing of new drugs. In recent years, many aspects of pharmaceutical industry regulation have undergone significant reform, and reform may continue. For example, the Chinese government implemented regulations that impact distribution of pharmaceutical products in China, where at most two invoices may be issued throughout the distribution chain, a change that required us to change our distribution paradigm. Any regulatory changes or amendments may result in increased compliance costs to our business or cause delays in or prevent the successful development or commercialization of our product candidates in China. Any failure by us or our partners to maintain compliance with applicable laws and regulations or obtain and maintain required licenses and permits may result in the suspension or termination of our business activities in China.

We have limited experience distributing drugs in China.

We have established a jointly owned entity with AstraZeneca in China, one that has a distribution license. It is subject to a new body of regulations pertaining to distribution with which we have limited experience. This new distribution structure may impose higher costs or limit or delay our ability to sell products to our principal customers, and may limit the near term sales of our products. There are operational risks associated with the jointly owned entity, such as working capital funding requirements and regulatory challenges, which could impact our ability to operate in China, including increasing sales of roxadustat. We have limited experience managing distribution of pharmaceutical products, and this new distribution structure may impose higher costs or limit or delay our ability to sell products to our principal customers, and may limit the near term sales of our products.

We use our own manufacturing facilities in China to produce roxadustat API and drug product. There are risks inherent to operating commercial manufacturing facilities, and with these being our single source suppliers, we may not be able to continually meet market demand.

We have two manufacturing facilities in China, with one located in Beijing and the other in Cangzhou, Hebei.

We will be obligated to comply with continuing cGMP requirements and there can be no assurance that we will maintain all of the appropriate licenses required to manufacture our product candidates for clinical and commercial use in China. In addition, we and our product suppliers must continually spend time, money and effort in production, record-keeping and quality assurance and appropriate controls in order to ensure that any products manufactured in our facilities meet applicable specifications and other requirements for product safety, efficacy and quality and there can be no assurance that our efforts will continue to be successful in meeting these requirements.

Manufacturing facilities in China are subject to periodic unannounced inspections by the NMPA and other regulatory authorities. We expect to depend on these facilities for our product candidates and business operations in China, and we do not yet have a secondary source supplier for either roxadustat API or drug product in China. Natural disasters or other unanticipated catastrophic events, including power interruptions, water shortages, storms, fires, pandemics (including the COVID-19 pandemic), earthquakes, terrorist attacks, government appropriation of our facilities, and wars, could significantly impair our ability to operate our manufacturing facilities. Certain equipment, records and other materials located in these facilities would be difficult to replace or would require substantial replacement lead-time that would impact our ability to successfully commercialize our product candidates in China. The occurrence of any such event could materially and adversely affect our business, financial condition, results of operations, cash flows and prospects.

As a company, we have limited experience in pharmacovigilance, medical affairs, and management of the third-party distribution logistics, and cannot assure you we will be able to meet regulatory requirements or operate in these capacities successfully.

We are responsible for commercial manufacturing, pharmacovigilance, medical affairs, and management of the third-party distribution logistics (with AstraZeneca through a jointly owned entity that will perform roxadustat distribution) for roxadustat commercial activities in China. While we have been increasing our staffing in these areas, as a company, we have no experience managing or operating these functions for a commercial product and there can be no guarantee that we will do so efficiently or effectively. Mistakes or delays in these areas could limit our ability to successfully commercialize roxadustat in China, could limit our eventual market penetration, sales and profitability, and could subject us to significant liability in China.

We and our collaboration partner in China, AstraZeneca, may experience difficulties in successfully growing and sustaining sales of roxadustat in China.

We and AstraZeneca have a profit sharing arrangement with respect to roxadustat in China and any difficulties we may experience in growing and sustaining sales will affect our bottom line. Difficulties may be related to our ability to maintain reasonable pricing and reimbursement, obtain hospital listing, or other difficulties related to distribution, marketing, and sales efforts in China. For example, our current National Reimbursement Drug List reimbursement pricing is effective for a standard two-year period (between January 1, 2020 to December 31, 2021), after which time we will have to renegotiate a new price for roxadustat, which we expect to be lower based upon historical precedents. Sales of roxadustat in China may ultimately be limited due to the complex nature of the healthcare system, low average personal income, pricing controls, still developing infrastructure and potentially rapid competition from other products.

The retail prices of any product candidates that we develop may be subject to pricing control in China and elsewhere.

The price for pharmaceutical products is highly regulated in China, both at the national and provincial level. Price controls may reduce prices to levels significantly below those that would prevail in less regulated markets or limit the volume of products that may be sold, either of which may have a material and adverse effect on potential revenues from sales of roxadustat in China. Moreover, the process and timing for the implementation of price restrictions is unpredictable, which may cause potential revenues from the sales of roxadustat to fluctuate from period to period.

FibroGen (China) Medical Technology Development Co., Ltd. ("FibroGen Beijing") would be subject to restrictions on paying dividends or making other payments to us, which may restrict our ability to satisfy our liquidity requirements.

We plan to conduct all of our business in China through FibroGen China Anemia Holdings, Ltd. and FibroGen Beijing. We may rely on dividends and royalties paid by FibroGen Beijing for a portion of our cash needs, including the funds necessary to service any debt we may incur and to pay our operating costs and expenses. The payment of dividends by FibroGen Beijing is subject to limitations. Regulations in China currently permit payment of dividends only out of accumulated profits as determined in accordance with accounting standards and regulations in China. FibroGen Beijing is not permitted to distribute any profits until losses from prior fiscal years have been recouped and in any event must maintain certain minimum capital requirements. FibroGen Beijing is also required to set aside at least 10.0% of its after-tax profit based on Chinese accounting standards each year to its statutory reserve fund until the cumulative amount of such reserves reaches 50.0% of its registered capital. Statutory reserves are not distributable as cash dividends. In addition, if FibroGen Beijing incurs debt on its own behalf in the future, the agreements governing such debt may restrict its ability to pay dividends or make other distributions to us. As of December 31, 2020, approximately $44.6 million of our cash and cash equivalents is held in China.

Any capital contributions from us to FibroGen Beijing must be approved by the Ministry of Commerce in China, and failure to obtain such approval may materially and adversely affect the liquidity position of FibroGen Beijing.

The Ministry of Commerce in China or its local counterpart must approve the amount and use of any capital contributions from us to FibroGen Beijing, and there can be no assurance that we will be able to complete the necessary government registrations and obtain the necessary government approvals on a timely basis, or at all. If we fail to do so, we may not be able to contribute additional capital to fund our Chinese operations, and the liquidity and financial position of FibroGen Beijing may be materially and adversely affected.

We may be subject to currency exchange rate fluctuations and currency exchange restrictions with respect to our operations in China, which could adversely affect our financial performance.

Most of our product sales will occur in local Chinese currency and our operating results will be subject to volatility from currency exchange rate fluctuations. To date, we have not hedged against the risks associated with fluctuations in exchange rates and, therefore, exchange rate fluctuations could have an adverse impact on our future operating results. Changes in value of the Renminbi against the U.S. dollar, Euro and other currencies is affected by, among other things, changes in China's political and economic conditions. Currently, the Renminbi is permitted to fluctuate within a narrow and managed band against a basket of certain foreign currencies. Any significant currency exchange rate fluctuations may have a material adverse effect on our business and financial condition.

In addition, the Chinese government imposes controls on the convertibility of the Renminbi into foreign currencies and the remittance of foreign currency out of China for certain transactions. Shortages in the availability of foreign currency may restrict the ability of FibroGen Beijing to remit sufficient foreign currency to pay dividends or other payments to us, or otherwise satisfy their foreign currency-denominated obligations. Under existing Chinese foreign exchange regulations, payments of current account items, including profit distributions, interest payments and balance of trade, can be made in foreign currencies without prior approval from the State Administration of Foreign Exchange by complying with certain procedural requirements. However, approval from State Administration of Foreign Exchange or its local branch is required where Renminbi is to be converted into foreign currency and remitted out of China to pay capital expenses such as the repayment of loans denominated in foreign currencies. The Chinese government may also at its discretion restrict access in the future to foreign currencies for current account transactions. If the foreign exchange control system prevents us from obtaining sufficient foreign currency to satisfy our operational requirements, our liquidity and financial position may be materially and adversely affected.

Because FibroGen Beijing's funds are held in banks that do not provide insurance, the failure of any bank in which FibroGen Beijing deposits its funds could adversely affect our business.

Banks and other financial institutions in China do not provide insurance for funds held on deposit. As a result, in the event of a bank failure, FibroGen Beijing may not have access to funds on deposit. Depending upon the amount of money FibroGen Beijing maintains in a bank that fails, its inability to have access to cash could materially impair its operations.

We may be subject to tax inefficiencies associated with our offshore corporate structure.

The tax regulations of the U.S. and other jurisdictions in which we operate are extremely complex and subject to change. New laws, new interpretations of existing laws, such as the Base Erosion Profit Shifting project initiated by the Organization for Economic Co-operation and Development, and any legislation proposed by the relevant taxing authorities, or limitations on our ability to structure our operations and intercompany transactions may lead to inefficient tax treatment of our revenue, profits, royalties, and distributions, if any are achieved.

In addition, our foreign subsidiaries and we have various intercompany transactions. We may not be able to obtain certain benefits under relevant tax treaties to avoid double taxation on certain transactions among our subsidiaries. If we are not able to avail ourselves to the tax treaties, we could be subject to additional taxes, which could adversely affect our financial condition and results of operations.

On December 22, 2017, the Tax Cuts and Jobs Act (Tax Act) was enacted which instituted various changes to the taxation of multinational corporations. Since inception, various regulations and interpretations have been issued by governing authorities and we continue to examine the impacts to our business, which could potentially have a material adverse effect on our business, results of operations or financial conditions.

Our foreign operations, particularly those in China, are subject to significant risks involving the protection of intellectual property.

We seek to protect the products and technology that we consider important to our business by pursuing patent applications in China and other countries, relying on trade secrets or pharmaceutical regulatory protection or employing a combination of these methods. We note that the filing of a patent application does not mean that we will be granted a patent, or that any patent eventually granted will be as broad as requested in the patent application or will be sufficient to protect our technology. There are a number of factors that could cause our patents, if granted, to become invalid or unenforceable or that could cause our patent applications not to be granted, including known or unknown prior art, deficiencies in the patent application, or lack of originality of the technology. Furthermore, the terms of our patents are limited. The patents we hold and the patents that may be granted from our currently pending patent applications have, absent any patent term adjustment or extension, a twenty-year protection period starting from the date of application.

Intellectual property rights and confidentiality protections in China may not be as effective as those in the U.S. or other countries for many reasons, including lack of procedural rules for discovery and evidence, low damage awards, and lack of judicial independence. Implementation and enforcement of China intellectual property laws have historically been deficient and ineffective and may be hampered by corruption and local protectionism. Policing unauthorized use of proprietary technology is difficult and expensive, and we may need to resort to litigation to enforce or defend patents issued to us or to determine the enforceability and validity of our proprietary rights or those of others. The experience and capabilities of China courts in handling intellectual property litigation varies and outcomes are unpredictable. An adverse determination in any such litigation could materially impair our intellectual property rights and may harm our business.

Uncertainties with respect to the China legal system could have a material adverse effect on us.

The legal system of China is a civil law system primarily based on written statutes. Unlike in a common law system, prior court decisions may be cited for reference but are not binding. Because the China legal system continues to rapidly evolve, the interpretations of many laws, regulations and rules are not always uniform and enforcement of these laws, regulations and rules involve uncertainties, which may limit legal protections available to us. Moreover, decision makers in the China judicial system have significant discretion in interpreting and implementing statutory and contractual terms, which may render it difficult for FibroGen Beijing to enforce the contracts it has entered into with our business partners, customers and suppliers. Different government departments may have different interpretations of certain laws and regulations, and licenses and permits issued or granted by one government authority may be revoked by a higher government authority at a later time. Navigating the uncertainty and change in the China legal system will require the devotion of significant resources and time, and there can be no assurance that our contractual and other rights will ultimately be enforced.

Changes in China's economic, governmental, or social conditions could have a material adverse effect on our business.

Chinese society and the Chinese economy continue to undergo significant change. Changes in the regulatory structure, regulations, and economic policies of the Chinese government could have a material adverse effect on the overall economic growth of China, which could adversely affect our ability to conduct business in China. The Chinese government continues to adjust economic policies to promote economic growth. Some of these measures benefit the overall Chinese economy, but may also have a negative effect on us. For example, our financial condition and results of operations in China may be adversely affected by government control over capital investments or changes in tax regulations. As the Chinese pharmaceutical industry grows and evolves, the Chinese government may also implement measures to change the regulatory structure and structure of foreign investment in this industry. We are unable to predict the frequency and scope of such policy changes and structural changes, any of which could materially and adversely affect FibroGen Beijing's development and commercialization timelines, liquidity, access to capital, and its ability to conduct business in China. Any failure on our part to comply with changing government regulations and policies could result in the loss of our ability to develop and commercialize our product candidates in China. In addition, the changing government regulations and policies could result in delays and cost increases to our development, manufacturing, approval, and commercialization timelines in China.

Our operations in China subject us to various Chinese labor and social insurance laws, and our failure to comply with such laws may materially and adversely affect our business, financial condition and results of operations.

We are subject to China Labor Contract Law, which provides strong protections for employees and imposes many obligations on employers. The Labor Contract Law places certain restrictions on the circumstances under which employers may terminate labor contracts and require economic compensation to employees upon termination of employment, among other things. In addition, companies operating in China are generally required to contribute to labor union funds and the mandatory social insurance and housing funds. Any failure by us to comply with Chinese labor and social insurance laws may subject us to late fees, fines and penalties, or cause the suspension or termination of our ability to conduct business in China, any of which could have a material and adverse effect on business, results of operations and prospects.

Risks Related to the Operation of Our Business

We have incurred significant losses since our inception and anticipate that we will continue to incur losses for the foreseeable future and may never achieve or sustain profitability. We may require additional financings in order to fund our operations.

We are a biopharmaceutical company with two lead product candidates in clinical development, roxadustat for anemia in CKD, myelodysplastic syndromes, and chemotherapy-induced anemia, and pamrevlumab for IPF, pancreatic cancer, and DMD. Most of our revenue generated to date has been based on our collaboration agreements and we have limited commercial drug product sales to date. We continue to incur significant research and development and other expenses related to our ongoing operations. Our net loss for the year ended December 31, 2020, 2019 and 2018 were $189.3 million, $77.0 million and $86.4 million, respectively. As of December 31, 2020, we had an accumulated deficit of $974.0 million. As of December 31, 2020, we had capital resources consisting of cash, cash equivalents and short-term investments of $686.5 million plus $0.2 million of long-term investments classified as available for sale securities. Despite contractual development and cost coverage commitments from our collaboration partners, AstraZeneca and Astellas, and the potential to receive milestone and other payments from these partners, and despite commercialization efforts in the China and Japan for roxadustat for the treatment of anemia caused by CKD, we anticipate we will continue to incur losses on an annual basis for the foreseeable future. If we do not successfully develop and continue to obtain regulatory approval for our existing or any future product candidates and effectively manufacture, market and sell the product candidates that are approved, we may never achieve or sustain profitability on a quarterly or annual basis. Our prior losses, combined with expected future losses, have had and will continue to have an adverse effect on our stockholders' equity and working capital. Our failure to become and remain profitable would depress the market price of our common stock and could impair our ability to raise capital, expand our business, diversify our product offerings or continue our operations.

We believe that we will continue to expend substantial resources for the foreseeable future as we continue late-stage clinical development of roxadustat, grow our operations in China, expand our clinical development efforts on pamrevlumab, continue to seek regulatory approval, establish commercialization capabilities of our product candidates, and pursue additional indications. These expenditures will include costs associated with research and development, conducting preclinical trials and clinical trials, obtaining regulatory approvals in various jurisdictions, and manufacturing and supplying products and product candidates for ourselves and our partners. The outcome of any clinical trial and/or regulatory approval process is highly uncertain and we are unable to fully estimate the actual costs necessary to successfully complete the development and regulatory approval process for our compounds in development and any future product candidates. We believe that the net proceeds from our 2017 public offerings, our existing cash and cash equivalents, short-term and long-term investments and accounts receivable, and expected third-party collaboration revenues will allow us to fund our operating plans through at least the next 12 months. Our operating plans or third-party collaborations may change as a result of many factors, including the success of our development and commercialization efforts, operations costs (including manufacturing and regulatory), competition, and other factors that may not currently be known to us, and we therefore may need to seek additional funds sooner than planned, through offerings of public or private securities, debt financings or other sources, such as royalty monetization or other structured financings. Such financings may result in dilution to stockholders, imposition of debt covenants and repayment obligations, or other restrictions that may adversely affect our business. We may also seek additional capital due to favorable market conditions or strategic considerations even if we currently believe that we have sufficient funds for our current or future operating plans.

Additional funds may not be available when we require them, or on terms that are acceptable to us. If adequate funds are not available to us on a timely basis, we may be required to delay, limit, reduce or terminate our research and development efforts or other operations or activities that may be necessary to commercialize our product candidates.

Most of our recent revenue has been earned from collaboration partners for our product candidates under development.

If either or both of our Astellas and AstraZeneca collaborations were to be terminated, we could require significant additional capital in order to proceed with development and commercialization of our product candidates, including with respect to our commercialization of roxadustat for the treatment of anemia caused by CKD, or we may require additional partnering in order to help fund such development and commercialization. If adequate funds or partners are not available to us on a timely basis or on favorable terms, we may be required to delay, limit, reduce or terminate our development or commercialization efforts or other operations.

We may encounter difficulties in managing our growth and expanding our operations successfully.

As we seek to advance our product candidates through clinical trials and commercialization, we will need to expand our development, regulatory, manufacturing, commercialization and administration capabilities or contract with third parties to provide these capabilities for us. As our operations expand and we continue to undertake the efforts and expense to operate as a public reporting company, we expect that we will need to increase the responsibilities on members of management in order to manage any future growth effectively. Our failure to accomplish any of these steps could prevent us from successfully implementing our strategy and maintaining the confidence of investors in us.

Loss of senior management and key personnel could adversely affect our business.

We are highly dependent on members of our senior management team, including Enrique Conterno, our Chief Executive Officer. The loss of the services of Mr. Conterno or any of our senior management could significantly impact the development and commercialization of our products and product candidates and our ability to successfully implement our business strategy.

Recruiting and retaining qualified commercial, development, scientific, clinical, and manufacturing personnel are and will continue to be critical to our success, particularly as we expand our commercialization operations. Furthermore, replacing executive officers and key employees may be difficult and may take an extended period of time because of the limited number of individuals in our industry with the breadth of skills and experience required to successfully develop, gain regulatory approval of and commercialize product candidates. We may be unable to hire, train, retain or motivate these key personnel on acceptable terms given the intense competition among numerous biopharmaceutical companies for similar personnel.

There is also significant competition, in particular in the San Francisco Bay Area, for the hiring of experienced and qualified personnel, which increases the importance of retention of our existing personnel. If we are unable to continue to attract and retain personnel with the quality and experience applicable to our product candidates, our ability to pursue our strategy will be limited and our business and operations would be adversely affected.

If product liability lawsuits are brought against us, we may incur substantial liabilities and may have to limit commercial operations.

We face an inherent risk of product liability as a result of the clinical testing, manufacturing and commercialization of our product candidates. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in a product, negligence, strict liability or breach of warranty. Claims could also be asserted under state consumer protection acts. If we are unable to obtain insurance coverage at levels that are appropriate to maintain our business and operations, or if we are unable to successfully defend ourselves against product liability claims, we may incur substantial liabilities or otherwise cease operations. Product liability claims may result in:

- termination of further development of unapproved product candidates or significantly reduced demand for any approved products;
- material costs and expenses to defend the related litigation;
- a diversion of time and resources across the entire organization, including our executive management;
- product recalls, withdrawals or labeling restrictions;
- termination of our collaboration relationships or disputes with our collaboration partners; and
- reputational damage negatively impacting our other product candidates in development.

If we fail to obtain and retain sufficient product liability insurance at an acceptable cost to protect against potential product liability claims, we may not be able to continue to develop our product candidates. We maintain product liability insurance in a customary amount for the stage of development of our product candidates. Although we believe that we have sufficient coverage based on the advice of our third-party advisors, there can be no assurance that such levels will be sufficient for our needs. Moreover, our insurance policies have various exclusions, and we may be in a dispute with our carrier as to the extent and nature of our coverage, including whether we are covered under the applicable product liability policy. If we are not able to ensure coverage or are required to pay substantial amounts to settle or otherwise contest the claims for product liability, our business and operations would be negatively affected.

Our business and operations would suffer in the event of computer system failures.

Despite the implementation of security measures, our internal computer systems, and those of our CROs, collaboration partners, and other third parties on which we rely, are vulnerable to damage from computer viruses, unauthorized access, natural disasters, fire, terrorism, war and telecommunication and electrical failures. We upgraded our disaster and data recovery capabilities in 2019, and have continued to upgrade these capabilities. However, to the extent that any disruption or security breach, in particular with our partners' operations, results in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and it could result in a material disruption and delay of our drug development programs. For example, the loss of clinical trial data from completed, ongoing or planned clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data.

We depend on sophisticated information technology systems and could face a cyber-attack or other breach of these systems.

We rely on information technology systems to process, transmit and store electronic information in our day-to-day operations. The size and complexity of our information technology systems makes them vulnerable to a cyber-attack, malicious intrusion, breakdown, destruction, loss of data privacy or other significant disruption. While we upgraded our disaster data recovery program in March 2019, a successful attack could result in the theft or destruction of intellectual property, data, or other misappropriation of assets, or otherwise compromise our confidential or proprietary information and disrupt our operations. Cyber-attacks are becoming more sophisticated and frequent. We have invested in our systems and the protection and recoverability of our data to reduce the risk of an intrusion or interruption, and we monitor and test our systems on an ongoing basis for any current or potential threats. There can be no assurance that these measures and efforts will prevent future interruptions or breakdowns. If we fail to maintain or protect our information technology systems and data integrity effectively or fail to anticipate, plan for or manage significant disruptions to these systems, we could have difficulty preventing, detecting and controlling such cyber-attacks and any such attacks could result in losses described above as well as disputes with physicians, patients and our partners, regulatory sanctions or penalties, increases in operating costs and expenses, expenses or lost revenues or other adverse consequences, any of which could have a material adverse effect on our business, results of operations, financial condition, prospects and cash flows.

Our headquarters are located near known earthquake fault zones.

We and some of the third-party service providers on which we depend for various support functions are vulnerable to damage from catastrophic events, such as power loss, natural disasters, terrorism and similar unforeseen events beyond our control. Our corporate headquarters and other facilities are located in the San Francisco Bay Area, which in the past has experienced severe earthquakes and fires, and has been affected by the COVID-19 pandemic, including economic disruption resulting from the related shelter-in-place and stay-at-home governmental orders.

After a comprehensive earthquake risk analysis conducted by Marsh Risk, we decided not to purchase earthquake or flood insurance. Based upon (among other factors) the Marsh Risk analysis, the design and construction of our building, the expected potential loss, and the costs and deductible associated with earthquake and flood insurance, we chose to self-insure. However, earthquakes or other natural disasters could severely disrupt our operations, or have a larger cost than expected, and have a material adverse effect on our business, results of operations, financial condition and prospects.

If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our headquarters, damaged critical infrastructure, or otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place are unlikely to provide adequate protection in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which, particularly when taken together with our lack of earthquake insurance, could have a material adverse effect on our business.

Furthermore, integral parties in our supply chain are operating from single sites, increasing their vulnerability to natural disasters or other sudden, unforeseen and severe adverse events, such as the COVID-19 pandemic. If such an event were to affect our supply chain, it could have a material adverse effect on our business.

Risks Related to Our Common Stock

The market price of our common stock may be highly volatile, and you may not be able to resell your shares at or above your purchase price.

In general, pharmaceutical, biotechnology and other life sciences company stocks have been highly volatile in the current market. The volatility of pharmaceutical, biotechnology and other life sciences company stocks is sometimes unrelated to the operating performance of particular companies and biotechnology and life science companies stocks often respond to trends and perceptions rather than financial performance. In particular, the market price of shares of our common stock could be subject to wide fluctuations in response to the following factors:

- results of clinical trials of our product candidates, including roxadustat and pamrevlumab;
- the timing of the release of results of and regulatory updates regarding our clinical trials;
- the level of expenses related to any of our product candidates or clinical development programs;
- results of clinical trials of our competitors' products;
- safety issues with respect to our product candidates or our competitors' products;
- regulatory actions with respect to our product candidates and any approved products or our competitors' products;
- fluctuations in our financial condition and operating results, which will be significantly affected by the manner in which we recognize revenue from the achievement of milestones under our collaboration agreements;
- adverse developments concerning our collaborations and our manufacturers;
- the termination of a collaboration or the inability to establish additional collaborations;
- the inability to obtain adequate product supply for any approved drug product or inability to do so at acceptable prices;
- disputes or other developments relating to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our technologies;
- changes in legislation or other regulatory developments affecting our product candidates or our industry;
- fluctuations in the valuation of the biotechnology industry and particular companies perceived by investors to be comparable to us;
- speculation in the press or investment community;
- announcements of investigations or regulatory scrutiny of our operations or lawsuits filed against us;
- activities of the government of China, including those related to the pharmaceutical industry as well as industrial policy generally;
- performance of other U.S. publicly traded companies with significant operations in China;
- changes in market conditions for biopharmaceutical stocks; and
- the other factors described in this "*Risk Factors*" section.

As a result of fluctuations caused by these and other factors, comparisons of our operating results across different periods may not be accurate indicators of our future performance. Any fluctuations that we report in the future may differ from the expectations of market analysts and investors, which could cause the price of our common stock to fluctuate significantly. Moreover, securities class action litigation has often been initiated against companies following periods of volatility in their stock price. This type of litigation could result in substantial costs and divert our management's attention and resources and could also require us to make substantial payments to satisfy judgments or to settle litigation.

Our principal stockholders own a significant percentage of our stock and will be able to exercise influence over stockholder approvals.

As of January 31, 2021, our executive officers, directors and principal stockholders, together with their respective affiliates, owned approximately 41.43% of our common stock, including shares subject to outstanding options that are exercisable within 60 days after such date and shares issuable upon settlement of restricted stock units that will vest within 60 days after such date. This percentage is based upon information supplied by officers, directors and principal stockholders and Schedules 13D and 13G, if any, filed with the SEC, which information may not be accurate as of January 31, 2020. Accordingly, these stockholders will be able to exert a significant degree of influence over our management and affairs and over matters requiring stockholder approval, including the election of our board of directors and approval of significant corporate transactions. The interests of this group may differ from those of other stockholders and they may vote their shares in a way that is contrary to the way other stockholders vote their shares. This concentration of ownership could have the effect of entrenching our management and/or the board of directors, delaying or preventing a change in our control or otherwise discouraging a potential acquirer from attempting to obtain control of us, which in turn could have a material and adverse effect on the fair market value of our common stock.

We may engage in acquisitions that could dilute stockholders and harm our business.

We may, in the future, make acquisitions of or investments in companies that we believe have products or capabilities that are a strategic or commercial fit with our present or future product candidates and business or otherwise offer opportunities for us. In connection with these acquisitions or investments, we may:

- issue stock that would dilute our existing stockholders' percentage of ownership;
- incur debt and assume liabilities; and
- incur amortization expenses related to intangible assets or incur large and immediate write-offs.

We may not be able to complete acquisitions on favorable terms, if at all. If we do complete an acquisition, we cannot assure you that it will ultimately strengthen our competitive position or that it will be viewed positively by customers, financial markets or investors. Furthermore, future acquisitions could pose numerous additional risks to our operations, including:

- problems integrating the purchased business, products or technologies, or employees or other assets of the acquisition target;
- increases to our expenses;
- disclosed or undisclosed liabilities of the acquired asset or company;
- diversion of management's attention from their day-to-day responsibilities;
- reprioritization of our development programs and even cessation of development and commercialization of our current product candidates;
- harm to our operating results or financial condition;
- entrance into markets in which we have limited or no prior experience; and
- potential loss of key employees, particularly those of the acquired entity.

We may not be able to complete any acquisitions or effectively integrate the operations, products or personnel gained through any such acquisition.

Provisions in our charter documents and Delaware law may have anti-takeover effects that could discourage an acquisition of us by others, and may prevent attempts by our stockholders to replace or remove our current directors or management.

Provisions in our amended and restated certificate of incorporation and amended and restated bylaws contain provisions that may have the effect of discouraging, delaying or preventing a change in control of us or changes in our management. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, thereby depressing the market price of our common stock. In addition, because our board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Among other things, these provisions:

- authorize "blank check" preferred stock, which could be issued by our board of directors without stockholder approval and may contain voting, liquidation, dividend and other rights superior to our common stock;
- create a classified board of directors whose members serve staggered three-year terms;
- specify that special meetings of our stockholders can be called only by our board of directors pursuant to a resolution adopted by a majority of the total number of directors;
- prohibit stockholder action by written consent;
- establish an advance notice procedure for stockholder approvals to be brought before an annual meeting of our stockholders, including proposed nominations of persons for election to our board of directors;
- provide that our directors may be removed prior to the end of their term only for cause;
- provide that vacancies on our board of directors may be filled only by a majority of directors then in office, even though less than a quorum;
- require a supermajority vote of the holders of our common stock or the majority vote of our board of directors to amend our bylaws; and
- require a supermajority vote of the holders of our common stock to amend the classification of our board of directors into three classes and to amend certain other provisions of our certificate of incorporation.

These provisions, alone or together, could delay or prevent hostile takeovers and changes in control or changes in our management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management.

Moreover, because we are incorporated in Delaware, we are governed by certain anti-takeover provisions under Delaware law which may discourage, delay or prevent someone from acquiring us or merging with us whether or not it is desired by or beneficial to our stockholders. We are subject to the provisions of Section 203 of the Delaware General Corporation Law, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner.

Any provision of our amended and restated certificate of incorporation, our amended and restated bylaws or Delaware law that has the effect of delaying or deterring a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our common stock, and could also affect the price that some investors are willing to pay for our common stock.

Changes in our tax provision or exposure to additional tax liabilities could adversely affect our earnings and financial condition.

As a multinational corporation, we are subject to income taxes in the U.S. and various foreign jurisdictions. Significant judgment is required in determining our global provision for income taxes and other tax liabilities. In the ordinary course of a global business, there are intercompany transactions and calculations where the ultimate tax determination is uncertain. Our income tax returns are subject to audits by tax authorities. Although we regularly assess the likelihood of adverse outcomes resulting from these examinations to determine our tax estimates, a final determination of tax audits or tax disputes could have an adverse effect on our results of operations and financial condition.

We are also subject to non-income taxes, such as payroll, excise, customs and duties, sales, use, value-added, net worth, property, gross receipts, and goods and services taxes in the U.S., state and local, and various foreign jurisdictions. We are subject to audit and assessments by tax authorities with respect to these non-income taxes and may have exposure to additional non-income tax liabilities, which could have an adverse effect on our results of operations and financial condition.

Federal and state tax laws impose substantial restrictions on the utilization of net operating loss and credit carryforwards in the event of an "ownership change" for tax purposes, as defined in IRC Section 382. If additional ownership change occurs, the utilization of net operating loss and credit carryforwards could be significantly reduced.

In addition, our judgment in providing for the possible impact of the Tax Act remains subject to developing interpretations of the provisions of the Tax Act. As regulations and guidance evolve with respect to the Tax Act, we continue to examine the impact to our tax provision or exposure to additional tax liabilities, which could have a material adverse effect on our business, results of operations or financial condition.

Tariffs imposed by the U.S. and those imposed in response by other countries could have a material adverse effect on our business.

Changes in U.S. and foreign governments' trade policies have resulted in, and may continue to result in, tariffs on imports into and exports from the U.S. Throughout 2018 and 2019, the U.S. imposed tariffs on imports from several countries, including China. In response, China has proposed and implemented their own tariffs on certain products, which may impact our supply chain and our costs of doing business. If we are impacted by the changing trade relations between the U.S. and China, our business and results of operations may be negatively impacted. Continued diminished trade relations between the U.S. and other countries, including potential reductions in trade with China and others, as well as the continued escalation of tariffs, could have a material adverse effect on our financial performance and results of operations.

Our certificate of incorporation designates courts located in Delaware as the sole forum for certain proceedings, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated certificate of incorporation provides that, subject to limited exceptions, the state and federal courts located in the State of Delaware will be the sole and exclusive forum for the following types of actions or proceedings under Delaware statutory or common law: (1) any derivative action or proceeding brought on our behalf, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders, (3) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated by-laws, or (4) any other action asserting a claim against us that is governed by the internal affairs doctrine. This provision would not apply to suits brought to enforce a duty or liability created by the Exchange Act. Furthermore, Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all such Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. To prevent having to litigate claims in multiple jurisdictions and the threat of inconsistent or contrary rulings by different courts, among other considerations, our amended and restated certificate of incorporation further provides that the U.S. federal district courts will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act. While the Delaware courts have determined that such choice of forum provisions are facially valid, a stockholder may nevertheless seek to bring a claim in a venue other than those designated in the exclusive forum provisions. In such instance, we would expect to vigorously assert the validity and enforceability of the exclusive forum provisions of our amended and restated certificate of incorporation. This may require significant additional costs associated with resolving such action in other jurisdictions and there can be no assurance that the provisions will be enforced by a court in those other jurisdictions.

This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and employees. If a court were to find these provisions of our amended and restated certificate of incorporation inapplicable to, or unenforceable in respect of, one or more of the specified types of actions or proceedings, we may incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect our business and financial condition.

We do not plan to pay dividends. Capital appreciation will be your sole possible source of gain, which may never occur.

You should not rely on an investment in our common stock to provide dividend income. We do not anticipate that we will pay any cash dividends to holders of our common stock in the foreseeable future and investors seeking cash dividends should not purchase our common stock. We plan to retain any earnings to invest in our product candidates and maintain and expand our operations. Therefore, capital appreciation, or an increase in your stock price, which may never occur, may be the only way to realize any return on your investment.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our corporate and research and development operations are located in San Francisco, California, where we lease approximately 234,000 square feet of office and laboratory space with approximately 35,000 square feet subleased. The lease for our San Francisco headquarters expires in 2023. We also lease approximately 67,000 square feet of office and manufacturing space in Beijing, China, and multiple office spaces in Beijing and Shanghai, China. Our leases in China expire in 2023. We have constructed a commercial manufacturing facility of approximately 5,500 square meters in Cangzhou, China, on approximately 33,000 square meters of land. Our right to use such land expires in 2068. We believe our facilities are adequate for our current needs and that suitable additional or substitute space would be available if needed.

ITEM 3. LEGAL PROCEEEDINGS

We are a party to various legal actions that arose in the ordinary course of our business. We recognize accruals for any legal action when we conclude that a loss is probable and reasonably estimable. We did not have any material accruals for any currently active legal action in our consolidated balance sheets as of December 31, 2020, as we could not predict the ultimate outcome of these matters, or reasonably estimate the potential exposure.

On April 20, 2020, in response to an invalidation action brought against certain FibroGen United Kingdom patents by Akebia, the United Kingdom court handed down a decision invalidating United Kingdom designations of European Patent Nos. 1463823, 1633333, 2298301, 2322153, and 2322155. The United Kingdom designation to European Patent No. 2289531 was held to be valid in amended form, but not infringed by Akebia. We and our partner Astellas have filed an appeal of the decision in the United Kingdom Court of Appeal.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

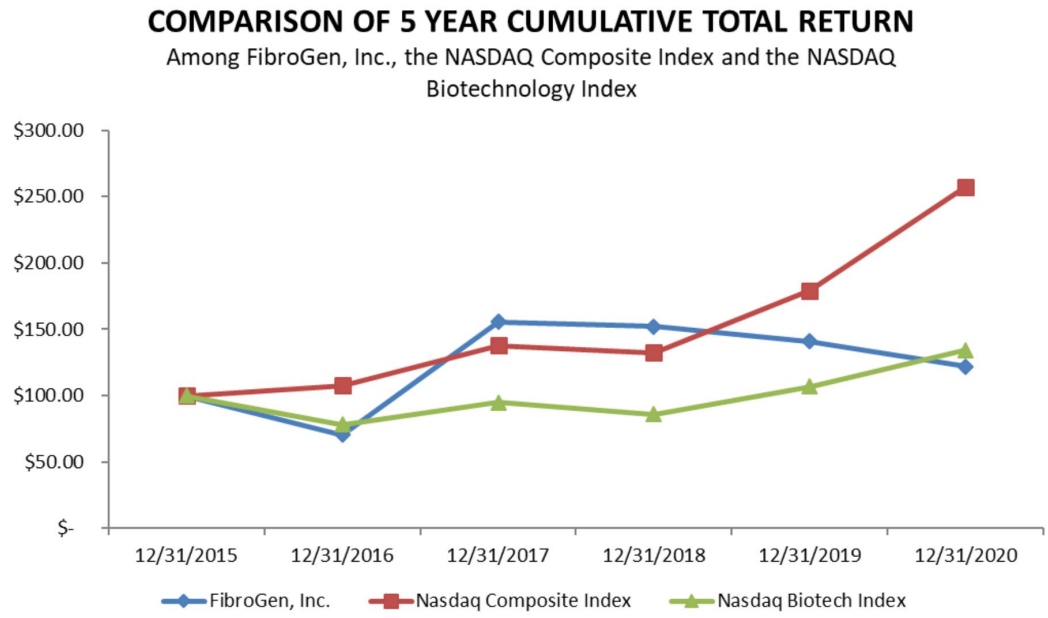
ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information for Common Stock

Our common stock has been listed on the NASDAQ Global Select Market ("NASDAQ") since November 14, 2014, under the symbol "FGEN." Prior to our initial public offering, there was no public market for our common stock.

Stock Price Performance Graph

The following graph illustrates a comparison of the total cumulative stockholder return for our common stock since December 31, 2015 to two indices: the NASDAQ Composite Index and the NASDAQ Biotechnology Index. The graph assumes an initial investment of $100 on December 31, 2015, in our common stock, the stocks comprising the NASDAQ Composite Index, and the stocks comprising the NASDAQ Biotechnology Index. The stockholder return shown in the graph below is not necessarily indicative of future performance, and we do not make or endorse any predictions as to future stockholder returns.



The above Stock Price Performance Graph and related information shall not be deemed "soliciting material" or to be "filed" with the Securities and Exchange Commission, nor shall such information be incorporated by reference into any future filing under the Securities Act or Exchange Act, except to the extent that we specifically incorporate it by reference into such filing.

Dividend Policy

We have never declared or paid any cash dividends on our capital stock. We currently intend to retain all available funds and any future earnings to support our operations and finance the growth and development of our business. We do not intend to pay cash dividends on our common stock for the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors and will depend on then-existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects and other factors our board of directors may deem relevant.

Stockholders

As of January 31, 2021, there were 129 registered stockholders of record for our common stock. This number of registered stockholders does not include stockholders whose shares are held in street name by brokers and other nominees, or may be held in trust by other entities. Therefore, the actual number of stockholders is greater than this number of registered stockholders of record.

Use of Proceeds from Initial Public Offering of Common Stock

On November 13, 2014, our Registration Statement on Form S-1, as amended (Reg. Nos. 333-199069 and 333-200189) was declared effective in connection with the initial public offering of our common stock. There has been no material change in the planned use of proceeds from our initial public offering as described in our final prospectus filed with the SEC pursuant to Rule 424(b) under the Securities Act on November 14, 2014.

Recent Sales of Unregistered Securities

None.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

None.

ITEM 6. SELECTED FINANCIAL DATA

We have adopted the amendment to eliminate Item 301 of Regulation S-K, and we are omitting this disclosure in reliance thereon.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and related notes and other financial information included in Item 8 of this Annual Report on Form 10-K. Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report, including information with respect to our plans and strategy for our business, international operations and product candidates, includes forward-looking statements that involve risks and uncertainties. You should review the "Risk Factors" section of this Annual Report for a discussion of important factors that could cause our actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

BUSINESS OVERVIEW

We are headquartered in San Francisco, California, with subsidiary offices in Beijing and Shanghai, People's Republic of China ("China"). We are a leading biopharmaceutical company developing and commercializing a pipeline of first-in-class therapeutics. We apply our pioneering expertise in hypoxia-inducible factor ("HIF") biology, 2-oxoglutarate enzymology, connective tissue growth factor ("CTGF") biology, and clinical development to advance innovative medicines for the treatment of anemia, fibrotic disease, and cancer.

Roxadustat, our most advanced product, is an oral small molecule inhibitor of HIF prolyl hydroxylase (together with HIF, "HIF-PH") activity that has received marketing authorization in China (tradename: 爱瑞卓®) for the treatment of anemia caused by chronic kidney disease ("CKD") in dialysis and non-dialysis patients. EVRENZO® (roxadustat) is also approved in Japan and Chile for the treatment of anemia associated with CKD in dialysis and non-dialysis patients.

Our New Drug Application ("NDA") filing in the United States ("U.S.") for roxadustat for the treatment of anemia in dialysis and non-dialysis CKD patients was submitted for review in December 2019 to the U.S. Food and Drug Administration ("FDA") and in December 2020, the FDA extended the review period of the NDA by three months for FibroGen to submit additional analyses of existing roxadustat clinical data, and set a new Prescription Drug User Fee Act ("PDUFA") goal date of March 20, 2021. On March 1, 2021, the FDA informed us that the Cardiovascular and Renal Drugs Advisory Committee will hold an advisory committee meeting to review the NDA for roxadustat. The date of the advisory committee meeting has not been set. As a result of this communication, we will not receive an approval decision by the PDUFA goal date. In Europe, the Marketing Authorization Application ("MAA") filing for roxadustat for the treatment of anemia in dialysis and non-dialysis CKD patients was accepted for regulatory review by the European Medicines Agency ("EMA") in May 2020 and Astellas Pharma Inc. ("Astellas") expects an approval decision mid-2021.

Roxadustat is in Phase 3 clinical development in the U.S. and Europe and in Phase 2/3 development in China for anemia associated with myelodysplastic syndromes. Roxadustat is in Phase 2 clinical development for chemotherapy-induced anemia.

Pamrevlumab, an anti-CTGF human monoclonal antibody, is in Phase 3 clinical development for the treatment of idiopathic pulmonary fibrosis ("IPF"), pancreatic cancer and Duchenne muscular dystrophy.

Impact of COVID-19

On March 11, 2020, COVID-19, a disease caused by a novel strain of the coronavirus, was characterized as a pandemic by the World Health Organization. The rapid spread has resulted in authorities implementing numerous measures to contain the virus, such as travel restrictions, social distancing requirements, quarantines, shelter-in-place orders or voluntarily adopted practices, and business shutdowns.

We have taken measures to minimize the health risks of COVID-19 to our staff, patients, healthcare providers and their communities, as their safety and well-being are our top priority. In the U.S., our employees are working remotely when possible, while in China they have returned to work in our offices, manufacturing plants, and are performing medical affairs out in the field. While we have seen some impacts from COVID-19, such as slower enrollment in our clinical trials, particularly our Phase 3 IPF program, we do not know if, or to what extent, these effects will continue in the future, as the impact of the COVID-19 pandemic continues to unfold. The effect on our operational and financial performance beyond those effects described above, including any impact on sales of roxadustat, will depend in large part on future developments with the pandemic, which cannot be predicted with confidence at this time. Future developments include the duration, scope, and severity of the COVID-19 pandemic, the actions taken to contain or mitigate its impact, the impact on governmental programs and budgets, the impact on healthcare systems and operating procedures, the development of treatments or vaccines, and the resumption of widespread economic activity. Due to the inherent uncertainty of the largely unprecedented and rapidly evolving situation, we are unable to predict with any confidence the likely impact of the COVID-19 pandemic on our future operations.

The financial results for the year ended December 31, 2020 were not significantly impacted by COVID-19 relative to prior years. However, we will continue to monitor, and to the extent possible, mitigate the impact of the COVID-19 pandemic on our business.

Financial Highlights

	Years Ended December 31,		
	2020	2019	2018
	(in thousands, except for per share data)		
Result of Operations			
Revenue	$ 176,319	$ 256,577	$ 212,958
Operating costs and expenses	368,199	345,891	299,651
Net loss	(189,291)	(76,970)	(86,420)
Net loss per share - basic and diluted	$ (2.11)	$ (0.89)	$ (1.03)

	December 31, 2020	December 31, 2019
	(in thousands)	
Balance Sheet		
Cash and cash equivalents	$ 678,393	$ 126,266
Short-term and long-term investments	$ 8,388	$ 468,609
Accounts receivable	$ 41,883	$ 28,455

Our revenue for the year ended December 31, 2020 included the revenues recognized related to the following:

- $15.0 million regulatory milestone associated with the NDA approval in Japan;
- $80.6 million development revenue recognized under collaboration agreements with our partners Astellas and AstraZeneca AB (“AstraZeneca”);
- $72.5 million of net product revenue from roxadustat commercial sales in China; and
- $8.9 million of drug product revenue related to roxadustat bulk drug or active pharmaceutical ingredient (“API”) deliveries to AstraZeneca and Astellas.

As comparison, our revenue for the year ended December 31, 2019 included the revenues recognized related to the following:

- $130.0 million total of two regulatory milestones associated with the planned MAA submission to the EMA under the collaboration agreement with Astellas for roxadustat as a treatment for dialysis and non-dialysis CKD patients;
- $50.0 million regulatory milestone associated with the NDA submission to the FDA under the collaboration agreement with AstraZeneca for roxadustat as a treatment for dialysis and non-dialysis CKD patients;
- $22.0 million total of three regulatory milestones associated with roxadustat being included on the updated National Reimbursement Drug List (“NRDL”) released by China’s National Healthcare Security Administration (“NHSA”);
- $12.5 million regulatory milestone associated with the NDA approval in Japan; and
- $36.3 million reduction in drug product revenue of a change in estimated variable consideration related to the API product revenue that was recognized in 2018, which reflected the total difference between estimated and actual listed price and yield from the manufacture of bulk product tablets.

Operating costs and expenses increased for the year ended December 31, 2020 compared to the prior year primarily due to the following:

- Higher clinical trial expenses associated with post-approval safety studies in China, and commencement of Phase 3 trials for pamrevlumab;
- Higher drug development expenses associated with drug substance manufacturing activities related to pamrevlumab, partially offset by lower activities related to roxadustat and capitalization of inventory manufacturing costs;
- Higher employee-related expenses primarily resulting from higher average compensation level and headcount;
- Higher stock-based compensation expense, primarily due to the cumulative impact of stock option grant activities;
- Higher legal expenses primarily associated with patent-related activities in the United Kingdom;
- Lower sales and marketing expenses due to a reversal in co-promotion expenses with AstraZeneca as a result of the China Amendment between FibroGen China and AstraZeneca; and
- Lower outside services due to lower consulting expenses and scientific contract work related to roxadustat Phase 3 and submission activities.

Our research and development expenses were $252.9 million, $209.3 million and $235.8 million for the years ended December 31, 2020, 2019 and 2018, respectively. Since inception and through December 31, 2020, we have incurred a total of approximately $2.2 billion in research and development expenses, a majority of which relates to the development of roxadustat, pamrevlumab and other HIF-PH inhibitors. We expect to continue to incur significant expenses and operating losses over at least the next several years and we expect our research and development expenses to increase in the future as we advance our product candidates through clinical trials and expand our product candidate portfolio. In addition, we expect to incur significant expenses relating to seeking regulatory approval for our product candidates and commercializing those products in various markets, including China. We consider the active management and development of our clinical pipeline to be particularly crucial to our long-term success. The process of conducting the necessary clinical research to obtain regulatory approval is costly and time consuming.

The actual probability of success for each of our product candidates and clinical programs, and our ability to generate product revenue and become profitable, depends upon a variety of factors, including the quality of the product candidate, clinical results, investment in the program, competition, manufacturing capability, commercial viability, and our and our partners' ability to successfully execute our development and commercialization plans. For a description of the numerous risks and uncertainties associated with product development, refer to "*Risk Factors*."

During the year ended December 31, 2020, we had a net loss of $189.3 million, or net loss per basic and diluted share of $2.11, as compared to a net loss of $77.0 million, or net loss per basic and diluted share of $0.89 for the prior year, primarily due to a decrease in revenue and an increase in operating expenses.

Cash and cash equivalents, investments and accounts receivable totaled $728.7 million at December 31, 2020, an increase of $105.4 million from December 31, 2019, primarily due to cash provided by operations.

Collaboration Partnerships for Roxadustat

Our current and future research, development, manufacturing and commercialization efforts with respect to roxadustat and our other product candidates currently in development depend on funds from our collaboration agreements with Astellas and AstraZeneca as described below.

Astellas

In June 2005, we entered into a collaboration agreement with Astellas for the development and commercialization (but not manufacture) of roxadustat for the treatment of anemia in Japan ("Japan Agreement"). In April 2006, we entered into the Europe Agreement with Astellas for roxadustat for the treatment of anemia in Europe, the Commonwealth of Independent States, the Middle East, and South Africa. Under these agreements, we provide Astellas the right to develop and commercialize roxadustat for anemia indications in these territories.

We share responsibility with Astellas for clinical development activities required for the U.S. and the Europe regulatory approval of roxadustat, and share equally those development costs under the agreed development plan for such activities. Astellas will be responsible for clinical development activities and all associated costs required for regulatory approval in all other countries in the Astellas territories. Astellas will own and have responsibility for regulatory filings in its territories. We are responsible, either directly or through our contract manufacturers, for the manufacture and supply of all quantities of roxadustat to be used in development and commercialization under the agreements. Astellas is responsible for roxadustat commercialization activities in the Astellas territories.

The Astellas agreements will continue in effect until terminated. Either party may terminate the agreements for certain material breaches by the other party. In addition, Astellas will have the right to terminate the agreements for certain specified technical product failures, upon generic sales reaching a particular threshold, upon certain regulatory actions, or upon our entering into a settlement admitting the invalidity or unenforceability of our licensed patents. Astellas may also terminate the agreements for convenience upon advance written notice to us. In the event of any termination of the agreements, Astellas will transfer and assign to us the regulatory filings for roxadustat and will assign or license to us the relevant trademarks used with the products in the Astellas territories. Under certain terminations, Astellas is also obligated to pay us a termination fee.

Consideration under these agreements includes a total of $360.1 million in upfront and non-contingent payments, and milestone payments totaling $557.5 million, of which $542.5 million are development and regulatory milestones and $15.0 million are commercial-based milestones. Total consideration, excluding development cost reimbursement and product sales-related payments, could reach $917.6 million. The aggregate amount of such consideration received through December 31, 2020 totals $645.1 million.

Additionally, under these agreements, Astellas pays 100% of the commercialization costs in their territories. In Europe, Astellas will pay us a tiered transfer price for our manufacture and supply of roxadustat based on net sales of roxadustat in the low 20% range. In Japan, Astellas pays us a transfer price in the low 20% range of the list price published by the Japanese Ministry of Health, Labour and Welfare, adjusted for certain elements.

During the fourth quarter of 2020, the Japanese Ministry of Health, Labour and Welfare approved EVRENZO® (roxadustat) for the treatment of anemia of CKD in adult patients not on dialysis. Accordingly, the consideration of $15.0 million associated with this milestone was included in the transaction price and allocated to performance obligations under the Japan Agreement in the fourth quarter of 2020, substantially all of which was recognized as revenue during the year ended December 31, 2020 from performance obligations satisfied or partially satisfied.

In September 2019, the Japanese Ministry of Health, Labour and Welfare approved roxadustat for the treatment of anemia associated with dialysis CKD patients. Accordingly, the consideration of $12.5 million associated with this milestone was included in the transaction price and allocated to performance obligations under the Japan Agreement in the third quarter of 2019. This milestone payment was received in October 2019.

During the second quarter of 2019, we received positive topline results from analyses of pooled major adverse cardiovascular event (“MACE”) and MACE+ data from its Phase 3 trials evaluating roxadustat as a treatment for dialysis and non-dialysis CKD patients, enabling Astellas to prepare for an MAA submission to the EMA in the second quarter of 2020, following our NDA submission to the FDA in 2019 and acceptance for review in February 2020. These milestones became probable of being achieved in the second quarter of 2019, and substantially all of the total consideration of $130.0 million associated with these milestones was included in the transaction price and allocated to performance obligations under the Europe Agreement in the second quarter of 2019, of which $128.8 million was recognized as revenue during 2019, and $0.8 million was recognized as revenue during 2020, from performance obligations satisfied or partially satisfied. According to the Europe Agreement, these milestone payments were billed to Astellas upon the submission of an MAA in the second quarter of 2020 and the total $130.0 million was received during the same quarter.

In 2018, FibroGen and Astellas entered into an amendment to the Japan Agreement that will allow Astellas to manufacture roxadustat drug product for commercialization in Japan (the "Japan Amendment"). Under this amendment, FibroGen would continue to manufacture and supply roxadustat API to Astellas. The commercial terms of the Japan Agreement relating to the transfer price for roxadustat for commercial use remain substantially the same, reflecting an adjustment for the manufacture of drug product by Astellas rather than FibroGen. We fulfilled delivery of a total of $64.8 million API under this amendment in 2018. In 2019, a change in estimated variable consideration resulted in a $36.3 million reduction to revenue associated with these API shipments, at the time the listed price for roxadustat was issued by the Japanese Ministry of Health, Labour and Welfare, which reflected the total difference between estimated and actual listed price and yield from the manufacture of bulk product tablets. In addition, in 2020, we recorded another $4.0 million reduction to revenue associated with these API shipments, related to a change in estimated variable consideration, based on the API held by Astellas at March 31, 2020 adjusted to reflect the updated listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and possible future changes to the listed price, adjusted for the timing of and estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

During the second quarter of 2020, we fulfilled delivery obligations under the term of the Japan Amendment, and recognized related drug product revenue of $8.2 million in the same period. The amount represents variable consideration and was estimated based on the quantity of product shipped, actual listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and possible future changes to the listed price, adjusted for the timing of and estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

During the fourth quarter of 2020, we shipped bulk drug product from process validation supplies for commercial sales under the term of the Europe Agreement. We constrained the estimated variable consideration due to a high degree of uncertainty associated to the final consideration because of an extended length of time over which the considerations may be adjusted. As a result, we constrained the consideration from this shipment, and recorded $1.4 million as current deferred revenue and $4.6 million as long-term deferred revenue as of December 31, 2020. The deferred revenue will be recognized over the duration of the contract and when uncertainty is resolved.

In the fourth quarter of 2018, we were engaged in the final stages of review with our partners over the proposed development of roxadustat for the treatment of chemotherapy-induced anemia. AstraZeneca and Astellas approved the program in December 2018 and January 2019, respectively. Costs associated with the development of this indication are shared 50-50 between our two partners. For revenue recognition purposes, we concluded that this new indication represents a modification to the Europe agreements and will be accounted for separately, meaning the development costs associated with the new indications are distinct from the original development costs. The development service period for roxadustat for the treatment of CIA under the Europe Agreement is estimated to continue through the end of 2023 to allow for development of this indication.

In addition, as of December 31, 2020, Astellas had separate investments of $80.5 million in the equity of FibroGen, Inc.

AstraZeneca

In July 2013, we entered into the U.S./RoW Agreement a collaboration agreement with AstraZeneca for roxadustat for the treatment of anemia in the U.S. and all territories not previously licensed to Astellas, except China. In July 2013, through our China subsidiary and related affiliates, we entered into the China Agreement a collaboration agreement with AstraZeneca for roxadustat for the treatment of anemia in China. Under these agreements, we provide AstraZeneca the right to develop and commercialize roxadustat for anemia in these territories. We share responsibility with AstraZeneca for clinical development activities required for U.S. regulatory approval of roxadustat, and FibroGen will transfer the U.S. NDA to AstraZeneca upon approval. AstraZeneca will hold the equivalent regulatory filings in the other licensed countries.

In 2015, we reached the $116.5 million cap on our initial funding obligations (during which time we shared 50% of the joint initial development costs), therefore all development and commercialization costs for roxadustat for the treatment of anemia in CKD in the U.S., Europe, Japan and all other markets outside of China have been paid by Astellas and AstraZeneca since reaching the cap.

In China, FibroGen (China) Medical Technology Development Co., Ltd. (“FibroGen Beijing”) will conduct the development work for CKD anemia, will hold all of the regulatory licenses issued by China regulatory authorities, and will be primarily responsible for regulatory, clinical and manufacturing. China development costs are shared 50/50. AstraZeneca is also responsible for 100% of development expenses in all other licensed territories outside of China. Outside of China, we are responsible, through our contract manufacturers, for the manufacture and supply of all quantities of roxadustat to be used in development and commercialization under the AstraZeneca agreements.

Under the AstraZeneca agreements, we will receive upfront and subsequent non-contingent payments totaling $402.2 million. Potential milestone payments under the agreements total $1.2 billion, of which $571.0 million are development and regulatory milestones and $652.5 million are commercial-based milestones. Total consideration under the agreements, excluding development cost reimbursement, transfer price payments, royalties and profit share, could reach $1.6 billion. The aggregate amount of such consideration received through December 31, 2020 totals $516.2 million.

Under the U.S./RoW Agreement, AstraZeneca will pay for all commercialization costs in the U.S. and RoW and AstraZeneca will be responsible for the U.S. commercialization of roxadustat, with FibroGen undertaking specified commercial activities in the U.S. In addition, we will receive a transfer price for delivery of commercial product based on a percentage of net sales in the low- to mid-single digit range and AstraZeneca will pay us a tiered royalty on net sales of roxadustat in the low 20% range.

Under the China Agreement, which is conducted through FibroGen China Anemia Holdings, Ltd. (“FibroGen Cayman”), FibroGen Beijing, and FibroGen International (Hong Kong) Limited (collectively, (“FibroGen China, the commercial collaboration was structured as a 50/50 profit share, which was amended by the China Amendment in the third quarter of 2020, as discussed and defined below in *China Amendment*.

AstraZeneca may terminate the U.S./RoW Agreement upon specified events, including our bankruptcy or insolvency, our uncured material breach, technical product failure, or upon 180 days prior written notice at will. If AstraZeneca terminates the U.S./RoW Agreement at will, in addition to any unpaid non-contingent payments, it will be responsible for paying for a substantial portion of the post-termination development costs under the agreed development plan until regulatory approval.

AstraZeneca may terminate the China Agreement upon specified events, including our bankruptcy or insolvency, our uncured material breach, technical product failure, or upon advance prior written notice at will. If AstraZeneca terminates our China Agreement at will, it will be responsible for paying for transition costs as well as make a specified payment to FibroGen.

In the event of any termination of the agreements, but subject to modification upon termination for technical product failure, AstraZeneca will transfer and assign to us any regulatory filings and approvals for roxadustat in the affected territories that they may hold under our agreements, grant us licenses and conduct certain transition activities.

As mentioned above, during the second quarter of 2019, we received positive topline results from analyses of pooled MACE and MACE+ data from its Phase 3 trials for roxadustat, enabling our U.S. NDA submission to the FDA. The regulatory milestone payment associated with this NDA submission became probable of being achieved in the second quarter of 2019. Accordingly, the consideration of $50.0 million associated with this milestone was included in the transaction price and allocated to performance obligations under the combined arrangement in the second quarter of 2019, of which $42.4 million was recognized as revenue during 2019, and $0.6 million was recognized as revenue during 2020, from performance obligations satisfied or partially satisfied. We submitted such NDA to the FDA in December 2019, which was accepted for review in February 2020. According to the U.S/RoW Agreement, this milestone payment is billable to AstraZeneca when the NDA is accepted by the FDA. Therefore, this $50.0 million milestone was billed during the first quarter of 2020, the payment of which was fully received in April 2020.

In December 2019, roxadustat has been included on the updated NRDL released by China’s NHSA for the treatment of anemia in CKD, covering patients who are non-dialysis-dependent as well as those who are dialysis-dependent. Accordingly, the total consideration of $22.0 million associated with these milestones was included in the transaction price and allocated to performance obligations under the combined arrangement in the fourth quarter of 2019. This milestone payment was fully received during the first quarter of 2020.

As mentioned above, in the fourth quarter of 2018, we were engaged in the final stages of review with our partners over the proposed development of roxadustat for the treatment of CIA. AstraZeneca and Astellas approved the program in December 2018 and January 2019, respectively. Costs associated with the development of this indication are expected to be shared 50-50 between our two partners. In addition to CIA, in December 2018, anemia of chronic inflammation and multiple myeloma have been approved for development by AstraZeneca and is expected to be fully funded by them. For revenue recognition purposes, we concluded that the approval of additional research and development services for these new indications represent modifications to our collaboration agreements in the periods in which approval was received. The research and development services associated with the new indications are distinct from other promises in our collaboration agreements, and will be accounted for separately. The development service period for roxadustat for the treatment of CIA, anemia of chronic inflammation and multiple myeloma under the AstraZeneca agreements is estimated to continue through the end of 2024, to allow for development of these additional indications.

China Amendment

On July 8, 2020, FibroGen China and AstraZeneca (together with FibroGen China, the "Parties") entered into an amendment, effective July 1, 2020, to the China Agreement, relating to the development and commercialization of roxadustat in China (the "China Amendment"). While the responsibilities of the Parties under the China Agreement remain largely the same, certain changes were made.

The China Amendment provides for the establishment of a jointly owned entity that will perform roxadustat distribution, as well as conduct sales and marketing through AstraZeneca. To prepare for the establishment of this jointly owned entity, in July 2020, FibroGen Beijing acquired Beijing Kangda Yongfu Pharmaceutical Co., LTD ("Kangda"). The purpose of the acquisition was to acquire a distribution license owned by Kangda for commercializing and distributing roxadustat in China. FibroGen Beijing continues to hold all of the regulatory licenses issued by China regulatory authorities and continues to be primarily responsible for regulatory, clinical, manufacturing, medical affairs and pharmacovigilance activities. In September 2020, FibroGen Beijing and AstraZeneca entered into an equity transfer agreement and shareholders agreement related to Kangda. Concurrently with the equity transfer, the two parties renamed Kangda to Beijing Falikang Pharmaceutical Co. Ltd. ("Falikang"). See Note 3, *Acquisition and Variable Interest Entity*, to the consolidated financial statements for details.

As Falikang is a distribution entity for roxadustat and AstraZeneca is the final decision maker for all the roxadustat commercialization activities, we lack the power criterion while AstraZeneca meets both the power and economic criteria under ASC 810, to direct the activities of Falikang that most significantly impact its performance. Therefore, we are not the primary beneficiary of Falikang. As a result, we accounted for our investment in Falikang under the equity method, and Falikang is not consolidated into our consolidated financial statements. In addition, we recognized our proportionate share of the reported profits or losses of Falikang, as other income (loss) in the consolidated statement of operations, and as an adjustment to its investment in unconsolidated subsidiary in the consolidated balance sheet. Falikang has not incurred material profit or loss to date.

In accordance with the China Amendment, we are currently in the interim period. The interim period is defined as the period from April 1, 2020 to the time when Falikang is fully operational, which commenced in January 2021. During the interim period, FibroGen continues to sell product directly to the distributors, who remain as our customers. The calculation for profit or loss share has changed related to sales of roxadustat in China for the period from April 1, 2020 onwards. With effect from April 1, 2020, the Parties have changed the method under which commercial expenses incurred by AstraZeneca are calculated and billed. AstraZeneca's co-promotion expenses for their sales and marketing efforts are now subject to a cap of a percentage of net sales. Once AstraZeneca has been fully reimbursed for their sales and marketing costs under the cap, AstraZeneca will bill the co-promotion expenses based on actual costs on a prospective basis. In addition, the China Amendment has allowed for a higher cost of manufacturing incurred by FibroGen Beijing to be included in the profit or loss share calculation, subject to an annual cap, among other changes.

Once Falikang is fully operational, AstraZeneca will bill the co-promotion expenses to Falikang, rather than FibroGen Beijing. In addition, FibroGen Beijing will manufacture and supply commercial product to Falikang based on an agreed upon transfer price. Development costs will continue to be shared 50/50 between the Parties.

As a result, the interim period primarily includes the following activities:

- Co-promotion expenses: The China Amendment revised the payment arrangements and calculation of the historical unpaid co-promotion expenses to AstraZeneca for its sales and marketing efforts associated with the commercial sales for roxadustat in China since the product launch. Under the previous China Agreement, payment of these historical co-promotion expenses was subject to certain profitability and cash flow thresholds. No amount of the historical co-promotion costs had been paid prior to the China Amendment as these thresholds had not yet been met. Under the China Amendment, a portion of the historical unpaid co-promotion expenses was adjusted to reduce the amount owed by FibroGen Beijing and the current period co-promotion expenses are capped at a percentage of net roxadustat sales in China. As a result, in the third quarter of 2020, we reversed approximately $84.4 million of previously accrued co-promotion expenses payable, which was recorded as a reduction to selling, general and administrative expenses, where these expenses were initially recorded during the periods from the initiation of commercial activities in the first quarter of 2019 to the second quarter of 2020. The co-promotion expenses for the year ended December 31, 2020, capped at a percentage of net roxadustat sales in China, were $27.2 million, included in the selling, general and administrative expenses. After this adjustment, as of December 31, 2020, $16.9 million and $11.5 million of the recalculated accrued co-promotion expenses were recorded in accounts payable and accrued liabilities, respectively, as they were anticipated to be paid within the next 12 months; and $27.4 million of the recalculated accrued co-promotion expenses remained in the long-term liabilities, as it is not anticipated to be paid within the next 12 months.
- Profit share: Profit/loss share between FibroGen Beijing and AstraZeneca is based on a calculation of the current period net roxadustat sales in China and deductible expenses pursuant to the China Agreement. Based on the calculation revised under the China Amendment, profit was achieved during the third and fourth quarter of 2020. As a result, we recorded a profit share liability of $7.0 million to AstraZeneca as of December 31, 2020 in the accrued and other current liabilities, which correspondingly reduced the deferred revenue related to the performance obligation in accordance with the China Agreement.

FibroGen, Inc. and AstraZeneca concurrently amended the U.S./RoW Agreement to reflect minor changes in the governance structure under the China Agreement.

Starting in the first quarter of 2021, our revenue will be made of 1) a transfer price from our sales to Falikang, and 2) sales made directly by FibroGen Beijing to distributors who have not transitioned to Falikang. The transfer price earned is expected to be in the range of 30-45% of Falikang’s net sales, which reflects the fact that Falikang will pay AstraZeneca the commercialization expenses and AstraZeneca’s profit share. For revenue recognition purposes, we estimate the total consideration on a per unit basis and recognize as we transfer control of the commercial drug product to Falikang.

Additional Information Related to Collaboration Agreements

Of the $1.1 billion in development and regulatory milestones payable in the aggregate under our Astellas and AstraZeneca collaboration agreements, $425.0 million is payable upon achievement of milestones relating to the submission and approval of roxadustat in dialysis-dependent CKD and non-dialysis-dependent CKD in the U.S. and Europe.

For more detailed discussions on the accounting for these agreements, refer to Note 4, *Collaboration Agreements and Revenues*, to the consolidated financial statements.

Total cash consideration received through December 31, 2020 and potential cash consideration, other than development cost reimbursement, transfer price payments, royalties and profit share, pursuant to our existing collaboration agreements are as follows:

	Cash Received Through December 31, 2020	Additional Potential Cash Payments	Total Potential Cash Payments
		(in thousands)	
Astellas--related-party:			
Japan Agreement	$ 105,093	$ 67,500	$ 172,593
Europe Agreement	540,000	205,000	745,000
Total Astellas	645,093	272,500	917,593
AstraZeneca:			
U.S. / RoW Agreement	439,000	810,000	1,249,000
China Agreement	77,200	299,500	376,700
Total AstraZeneca	516,200	1,109,500	1,625,700
Total revenue	$ 1,161,293	$ 1,382,000	$ 2,543,293

These collaboration agreements also provide for reimbursement of certain fully burdened research and development costs as well as direct out of pocket expenses.

RESULTS OF OPERATIONS

Revenue

	Years Ended December 31,			Change 2020 vs. 2019	
	2020	2019	2018	$	%
		(dollars in thousands)			
Revenue:					
License revenue	$ 14,323	$ 177,086	$ 22,269	$ (162,763)	(92) %
Development and other revenue	80,592	114,115	125,913	(33,523)	(29) %
Product revenue, net	72,498	1,700	—	70,798	4,165 %
Drug product revenue	8,906	(36,324)	64,776	45,230	(125) %
Total revenue	$ 176,319	$ 256,577	$ 212,958	$ (80,258)	(31) %

Our revenue to date has been generated substantially from our collaboration agreements with Astellas and AstraZeneca. In addition, we started roxadustat commercial sales in China in the third quarter of 2019.

Under our revenue recognition policy, license revenue includes amounts from upfront, non-refundable license payments and amounts allocated pursuant to the standalone selling price method from other consideration received during the periods. This revenue is generally recognized as deliverables are met and services are performed. License revenues represented 8%, 69% and 11% of total revenues for the years ended December 31, 2020, 2019 and 2018, respectively.

Development revenue includes co-development and other development related services. Co-development services are recognized as revenue in the period in which they are billed to our partners, excluding China. For China co-development services, revenue is deferred until we begin to transfer control of the manufactured commercial drug product to AstraZeneca.. Other development related services are recognized as revenue over the non-contingent development period based on a proportional performance method. As of December 31, 2020, the estimated future non-contingent development periods range from 3 to 48 months. Other revenues consist of sales of research and development material and have not been material for any of the periods presented. Development and other revenues represented 46%, 44% and 59% of total revenues for the years ended December 31, 2020, 2019 and 2018, respectively.

We started generating net product revenue from commercial sales of roxadustat drug product in China in the third quarter of 2019. Product revenue is recognized when our customer obtains control of promised goods or services in an amount that reflects the consideration we expect to receive in exchange for those goods or services. Product revenue represented 41% and 1% of total revenue for the year ended December 31, 2020 and 2019, respectively.

Drug product revenue includes commercial-grade API or bulk drug product sales to AstraZeneca and Astellas in support of pre-commercial preparation prior to the NDA or MAA approval, and to Astellas for ongoing commercial launch in Japan. Drug product revenue is recognized when we fulfill the delivery obligations. The amount of variable consideration that is included in the transaction price may be constrained, and is included in the drug product revenue only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur in a future period when the uncertainty associated with the variable consideration is subsequently resolved. Actual amounts of consideration ultimately received in the future may differ from our estimates, for which we will adjust these estimates and affect the drug product revenue in the period such variances become known. Drug product revenues represented 5%, (14)% and 30% of total revenues for the years ended December 31, 2020, 2019 and 2018, respectively.

In the future, we will continue generating revenue from collaboration agreements in the form of license fees, milestone payments, reimbursements for collaboration services and royalties on product sales, and from product sales. We expect that any revenues we generate will fluctuate from quarter to quarter due to the uncertain timing and amount of such payments and sales.

Total revenue decreased $80.3 million, or 31% for the year ended December 31, 2020 compared to the year ended December 31, 2019 for the reasons discussed in the sections below.

License Revenue

	Years Ended December 31,			Change 2020 vs. 2019	
	2020	2019	2018	$	%
	(dollars in thousands)				
License revenue:					
Astellas	$ 14,323	$ 129,405	$ 14,323	$ (115,082)	(89) %
AstraZeneca	—	47,681	7,946	(47,681)	(100) %
Total license revenue	$ 14,323	$ 177,086	$ 22,269	$ (162,763)	(92) %

License revenue decreased $162.8 million, or 92% for the year ended December 31, 2020 compared to the year ended December 31, 2019.

License revenue recognized under our collaboration agreements with Astellas decreased $115.1 million, or 89% for the year ended December 31, 2020 compared to the year ended December 31, 2019. License revenue recognized under our collaboration agreements with Astellas for the year ended December 31, 2020 represented the allocated revenue of related to a regulatory milestone of $15.0 million associated with the NDA approval in Japan achieved during the fourth quarter of 2020. License revenue recognized under our collaboration agreements with Astellas for the year ended December 31, 2019 represented the allocated revenue of $117.5 million related to two regulatory milestones totaling $130.0 million associated with the planned MAA submission in Europe that were included in the transaction price during the second quarter of 2019 when these milestones became probable of being achieved; and the allocated revenue of $11.9 million related to a regulatory milestone of $12.5 million associated with the NDA approval in Japan achieved during the third quarter of 2019.

We did not have any license revenue under our collaboration agreements with AstraZeneca for the year ended December 31, 2020. License revenue recognized under our collaboration agreements with AstraZeneca for the year ended December 31, 2019 represented the revenue allocated to the U.S./RoW license of $33.1 million related to a regulatory milestone of $50.0 million associated with the NDA submission in the U.S. that was included in the transaction price during the second quarter of 2019 when this milestone became probable of being achieved; and the revenue allocated to the U.S./RoW license of $14.6 million related to three regulatory milestones totaling $22.0 million associated with roxadustat being included on the updated NRDL released by China’s NHSA during the fourth quarter of 2019.

Development and Other Revenue

	Years Ended December 31,			Change 2020 vs. 2019	
	2020	2019	2018	$	%
	(dollars in thousands)				
Development revenue:					
Astellas	$ 19,174	$ 29,394	$ 20,903	$ (10,220)	(35) %
AstraZeneca	61,418	84,719	104,970	(23,301)	(28) %
Total development revenue	80,592	114,113	125,873	(33,521)	(29) %
Other revenue	—	2	40	(2)	(100) %
Total development and other revenue	$ 80,592	$ 114,115	$ 125,913	$ (33,523)	(29) %

Development and other revenue decreased $33.5 million, or 29% for the year ended December 31, 2020 compared to the year ended December 31, 2019.

Development revenue recognized under our collaboration agreements with Astellas decreased $10.2 million, or 35% for the year ended December 31, 2020 compared to the year ended December 31, 2019. Development revenue recognized under our collaboration agreements with Astellas for the year ended December 31, 2020 included the allocated revenue of $0.7 million related to the above-mentioned $15.0 million associated with the NDA approval in Japan achieved during the fourth quarter of 2020. Development revenue recognized under our collaboration agreements with Astellas for the year ended December 31, 2019 included the allocated revenue of $11.4 million related to the above-mentioned $130.0 million associated with the regulatory milestones of the planned MAA submission in Europe, and the allocated revenue of $0.5 million related to the above-mentioned $12.5 million associated with the NDA approval in Japan. The decrease for the year ended December 31, 2020 was partially offset by an increase in co-development billings related to related to higher medical affairs activities under the Europe Agreement.

Development revenue recognized under our collaboration agreements with AstraZeneca decreased $23.3 million, or 28% for the year ended December 31, 2020 compared to the year ended December 31, 2019, primarily due to a decrease in co-development billings related to the development of roxadustat as a result of the substantial completion of Phase 3 trials for roxadustat. Development revenue recognized under our collaboration agreements with AstraZeneca for the year ended December 31, 2019 also included the allocated revenue of $9.3 million related to the above-mentioned $50.0 million associated with the regulatory milestone of the NDA submission in the U.S., and the allocated revenue of $4.1 million related to the above-mentioned regulatory milestones totaling $22.0 million associated with roxadustat being included on the updated NRDL released by China's NHSA.

Product Revenue, Net

	Years Ended December 31,		Change 2020 vs. 2019	
	2020	2019	$	%
	(dollars in thousands)			
Gross revenue	$ 89,027	$ 2,803	$ 86,224	3,076 %
Price adjustment	—	(936)	936	(100) %
Non-key account hospital listing award	(9,325)	—	(9,325)	100 %
Contractual sales rebate	(6,189)	(149)	(6,040)	4,054 %
Other discounts and rebates	(923)	(18)	(905)	5,028 %
Sales return	(92)	—	(92)	100 %
Product revenue, net	$ 72,498	$ 1,700	$ 70,798	4,165 %

We started roxadustat commercial sales in China in the third quarter of 2019. Therefore, the year-over-year comparison would not be meaningful, as the prior year was at limited sales volume.

The gross product revenue for the year ended December 31, 2020 was $89.0 million.

In the second quarter of 2020, we amended the agreement with our pharmaceutical distributors, which triggered accounting modifications particularly related to non-key account hospital listing award. For the year ended December 31, 2020, the non-key account hospital listing award was $9.3 million, which was recorded as a reduction to the revenue and calculated based on eligible non-key account hospital listing to date achieved by each distributor with certain requirements met during the period.

For the year ended December 31, 2020 and 2019, the contractual sales rebate was $6.2 million and $0.1 million, respectively, which were calculated based on the stated percentage of gross sales by each distributor in the distribution agreement entered between FibroGen and each distributor. All other rebates and discounts, including sales return allowance were immaterial for the periods presented.

For the year ended December 31, 2019, a $0.9 million of price adjustment was recorded based on government-listed price guidance and estimated channel inventory levels.

Drug Product Revenue

	Years Ended December 31,			Change 2020 vs. 2019	
	2020	2019	2018	$	%
	(dollars in thousands)				
Drug product revenue:					
Astellas	$ 4,281	$ (36,324)	$ 64,776	$ 40,605	(112) %
AstraZeneca	4,625	—	—	4,625	100 %
Total drug product revenue:	$ 8,906	$ (36,324)	$ 64,776	$ 45,230	(125) %

In 2018, FibroGen and Astellas entered into the Japan Amendment. Under this amendment, FibroGen would continue to manufacture and supply roxadustat API to Astellas for the roxadustat commercial launch in Japan. We fulfilled the shipment obligations under the term of the Japan Amendment during the year ended December 31, 2018, and recognized the related product revenue of $64.8 million based on a transaction price that was subject to potential future adjustments, which represented a form of variable consideration.

Related to the above API shipments in 2018, a change in estimated variable consideration incurred in 2019 at the time the actual listed price for roxadustat was issued by the Japanese Ministry of Health, Labour and Welfare, which resulted in a total difference of $36.3 million between the estimated and the actual listed price and yield from the manufacture of bulk product tablets. In addition, during the year ended December 31, 2020, we recorded another $4.0 million reduction to drug product revenue, related to a change in estimated variable consideration, based on the API held by Astellas at March 31, 2020 adjusted to reflect the updated listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and changes in the estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

During the second quarter of 2020, we fulfilled shipment obligations under the term of the Japan Amendment, and recognized the related drug product revenue of $8.2 million in the same period. The amount represents variable consideration and was estimated based on the quantity of product shipped, actual listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and possible future changes to the listed price, adjusted for the timing of and estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

During the fourth quarter of 2020, we shipped bulk drug product from process validation supplies for commercial purposes under the term of the Europe Agreement. We constrained the consideration of this shipment due to a high degree of uncertainty associated to the final consideration. As a result, we recorded $1.4 million as current deferred revenue and $4.6 million as long-term deferred revenue as of December 31, 2020. The deferred revenue will be recognized as and when uncertainty is resolved.

Under the U.S./RoW Agreement, FibroGen would manufacture and supply roxadustat bulk drug product to AstraZeneca in support of commercial supplies. We shipped bulk drug product to AstraZeneca as pre-commercial supply for process validation purposes during the year ended December 31, 2020 and recognized drug product revenue of $4.6 million. The drug product revenue amount represents variable consideration and was estimated based on the quantity of product shipped and an estimated price.

Operating Costs and Expenses

	Years Ended December 31,			Change 2020 vs. 2019	
	2020	2019	2018	$	%
	(dollars in thousands)				
Operating costs and expenses					
Cost of goods sold	$ 8,869	$ 1,147	$ —	$ 7,722	673 %
Research and development	252,924	209,265	235,839	43,659	21 %
Selling, general and administrative	106,406	135,479	63,812	(29,073)	(21) %
Total operating costs and expenses	$ 368,199	$ 345,891	$ 299,651	$ 22,308	6 %

We have taken measures to minimize the health risks of COVID-19 to our staff, patients, healthcare providers and their communities, as their safety and well-being are our top priority. In the U.S., our employees are working remotely when possible, while in China they have returned to work in our offices, manufacturing plants, and are performing medical affairs out in the field. We have also seen some reduced enrollment in our clinical trials, particularly for our IPF pamrevlumab trial. However, the overall impact of COVID-19 on our expenses was not significant. In the year ended December 31, 2020, some reduction in expenses, such as due to reduced travel and paused or slowed enrollment for trials, were offset by some increased expenses, such as in patient care.

Total operating expenses increased $22.3 million, or 6%, for the year ended December 31, 2020 compared to the year ended December 31, 2019, for the reasons discussed in the sections below.

Cost of goods sold

Cost of goods sold was $8.9 million and $1.1 million for the years ended December 31, 2020 and 2019, respectively, and primarily consisted of costs associated with the manufacturing of roxadustat product and storage and logistic costs. We started commercial sales of roxadustat drug product in China in the third quarter of 2019. Cost of goods sold, associated with the roxadustat commercial sales in China, consists of direct costs to manufacture commercial product, as well as indirect costs including factory overhead, storage, shipping, quality assurance, idle capacity charges, and inventory valuation adjustments. The year-over-year comparison would not be meaningful as the prior year was the first year for roxadustat commercial sales with limited sales volume. Cost of goods sold associated with the roxadustat drug product revenue in the U.S. was not material for the year ended December 31, 2020 and 2019. We expect costs of goods sold to increase in relation to drug product revenue as we deplete inventories that we had expensed prior to receiving regulatory approvals.

Research and Development Expenses

Research and development expenses consist of third-party research and development costs and the fully-burdened amount of costs associated with work performed under collaboration agreements. Research and development costs include employee-related expenses for research and development functions, expenses incurred under agreements with clinical research organizations (“CROs”), other clinical and preclinical costs and allocated direct and indirect overhead costs, such as facilities costs, information technology costs and other overhead. Research and development costs are expensed as incurred. Costs for certain development activities are recognized based on an evaluation of the progress to completion of specific tasks using information and data provided to us by our vendors and our clinical sites.

The following table summarizes our research and development expenses incurred during the years ended December 31, 2020, 2019 and 2018:

Product Candidate	Phase of Development	Years Ended December 31, 2020	2019	2018
		(in thousands)		
Roxadustat	Phase 3	$ 122,962	$ 125,429	$ 139,876
Pamrevlumab	Phase 2/3	111,728	58,750	72,063
FG-5200	Preclinical	4,132	5,323	5,122
Other research and development expenses		14,102	19,763	18,778
Total research and development expenses		$ 252,924	$ 209,265	$ 235,839

The program-specific expenses summarized in the table above include costs we directly attribute to our product candidates. We allocate research and development salaries, benefits, stock-based compensation and other indirect costs to our product candidates on a program-specific basis, and we include these costs in the program-specific expenses. We expect our research and development expenses to increase in the future as we advance our product candidates through clinical trials and expand our product candidate portfolio.

Research and development expenses increased $43.7 million, or 21%, for the year ended December 31, 2020 compared to the year ended December 31, 2019 as a result of the net effect of the following:

- Increase of $36.1 million in clinical trials costs, primarily due to commencement of Phase 3 trials for pamrevlumab and post-approval safety studies in China;
- Increase of $10.3 million in drug development expenses, primarily due to higher drug substance manufacturing activities and supplies related to pamrevlumab, and higher supply chain expenses related to roxadustat, partially offset by lower drug substance manufacturing activities related to roxadustat and lower drug product manufacturing costs related to pamrevlumab;
- Increase of $5.2 million in stock-based compensation expense, primarily due to the cumulative impact of stock option grant activities and accelerated recognition due to departure of certain executive employees;
- Increase of $3.2 million in employee-related costs primarily due to higher headcount in the research and development functions in China and higher compensation levels, partially offset by decrease in events and travel costs due to the COVID-19 pandemic;
- Increase of $3.1 million in facility related expense, primarily due to higher allocated overhead costs, higher depreciation expenses related to China facilities and general maintenance expenses;
- Decrease of $6.1 million due to capitalization of inventory manufacturing costs associated with roxadustat production; and
- Decrease of $5.3 million in outside services due to lower consulting expenses and scientific contract work related to roxadustat Phase 3 and submission activities.

Selling, General and Administrative Expenses

We started to incur sales and marketing expenses in the first quarter of 2019 in China to prepare for commercial operations. Selling, general and administrative (“SG&A”) expenses consist primarily of employee-related expenses for executive, operational, finance, legal, compliance, and human resource functions. SG&A expenses also include facility-related costs, professional fees, accounting and legal services, other outside services including co-promotional expenses, recruiting fees and expenses associated with obtaining and maintaining patents.

We anticipate that our SG&A expenses will increase in the future as we anticipate an increase in payroll and related expenses associated with an increase in headcount to support the growth of the business in connection with potential commercialization of our product candidates.

SG&A expenses decreased $29.1 million, or 21%, for the year ended December 31, 2020 compared to the year ended December 31, 2019, as a result of the net effect of the following:

- Decrease of $44.9 million in outside service expenses, resulting from the above-mentioned reversal of previously accrued co-promotion expenses payable, which was recorded as a reduction to selling, general and administrative expenses. In addition, current year co-promotion expenses are capped at a percentage of net sales;
- Increase of $6.8 million in employee-related costs primarily due to higher headcount in the sales and marketing functions in China and higher compensation levels; and
- Increase of $4.2 million in legal expenses primarily associated with patent-related activities in United Kingdom.

Interest and Other, Net

	Years Ended December 31,			Change 2020 vs. 2019	
	2020	2019	2018	$	%
	(dollars in thousands)				
Interest and other, net:					
Interest expense	$ (2,402)	$ (2,876)	$ (10,991)	$ 474	(16) %
Investment loss in unconsolidated variable interest entity	(202)	—	—	(202)	100 %
Interest income and other, net	5,553	15,548	11,568	(9,995)	(64) %
Total interest and other, net	$ 2,949	$ 12,672	$ 577	$ (9,723)	(77) %

Interest Expense

Interest expense relates to our finance lease liabilities accretion primarily for our leased facilities in San Francisco and China. Interest expense also includes interest related to the Technology Development Center of the Republic of Finland product development obligations.

Interest expense decreased $0.5 million, or 16%, for the year ended December 31, 2020 compared to the year ended December 31, 2019 due to lower interest rates related to our finance lease liabilities.

Investment Loss in Unconsolidated Variable Interest Entity

Investment loss in unconsolidated variable interest entity represented our proportionate share of the reported profits or losses of Falikang, an unconsolidated VIE accounted for under the equity method, and was immaterial for the year ended December 31, 2020. See Note 3, *Acquisition and Variable Interest Entity*, to the consolidated financial statements for details.

Interest Income and Other, Net

Interest income and other, net primarily include interest income earned on our cash, cash equivalents and investments, foreign currency transaction gains (losses), remeasurement of certain monetary assets and liabilities in non-functional currency of our subsidiaries into the functional currency, realized gains (losses) on sales of investments.

Interest income and other, net decreased $10.0 million, or 64%, for the year ended December 31, 2020 compared to the year ended December 31, 2019, primarily due to lower interest earned on our cash, cash equivalents and investments of $9.4 million associated with the lower average balances.

On April 1, 2020, FibroGen Beijing adopted Renminbi Yuan (“CNY”) as its functional currency based on reassessment of the primary economic environment in which FibroGen Beijing operates, as such environment was mainly associated with its growing manufacturing and product sales activities conducted in CNY. Prior to April 1, 2020, FibroGen Beijing’s functional currency was the U.S. dollar. This change did not result in material impact to unrealized foreign currency gain or loss during the year ended December 31, 2020.

Provision for Income Taxes

	Years Ended December 31,		
	2020	2019	2018
	(dollars in thousands)		
Loss before income taxes	$ (188,931)	$ (76,642)	$ (86,116)
Provision for income taxes	360	328	304
Effective tax rate	(0.2)%	(0.4)%	(0.4)%

The provisions for income taxes for the years end December 31, 2020 and 2019 were due to foreign taxes.

On March 27, 2020, the Coronavirus Aid, Relief and Economic Security Act (“CARES Act”) was enacted and signed into law. The CARES Act includes changes to the tax provisions that benefits business entities, and makes certain technical corrections to the 2017 Tax Cuts and Jobs Act. U.S. GAAP requires recognition of the tax effects of new legislation during the reporting period that includes the enactment date. We evaluated and determined that the impact is immaterial.

Based upon the weight of available evidence, which includes our historical operating performance, reported cumulative net losses since inception and expected continuing net loss, we have established a full valuation allowance against our net deferred tax assets as we do not currently believe that realization of those assets is more likely than not. We will continue to maintain a full valuation allowance on our net deferred tax assets until there is sufficient evidence to support the reversal of all or some portion of this allowance.

During 2020, we transferred certain intellectual property rights relating to our Chinese business between our wholly owned subsidiaries that are based in different tax jurisdictions. The transferor entity was not subject to income taxes in its local jurisdiction. The acquiring entity of the intellectual property is entitled to amortize the acquisition price of the intangible assets for tax purposes. In accordance with ASU 2016-16, *Intra-Entity Transfers of Assets Other Than Inventory*, we recognized a deferred tax asset of $78.7 million for the temporary difference arising from the acquirer's excess tax basis. Furthermore, based upon the weight of available evidence, we recognized a full valuation allowance against this deferred tax asset since it does not currently believe that realization of this gross deductible temporary difference is more likely than not. Accordingly, this inter-company transfer did not have a material impact to our consolidated financial statements.

LIQUIDITY AND CAPITAL RESOURCES

Financial Conditions

We have historically funded our operations principally from the sale of common stock (including our public offering proceeds) and from the execution of collaboration agreements involving license payments, milestones and reimbursement for development services.

As of December 31, 2020, we had cash and cash equivalents of $678.4 million. As of December 31, 2020, we had short-term and long-term investments of $8.1 million and $0.2 million, respectively. Cash is invested in accordance with our investment policy, primarily with a view to liquidity and capital preservation. Investments, consisting of available-for-sale debt investments and marketable equity investments, and stated at fair value, are also available as a source of liquidity. As of December 31, 2020, a total of $66.0 million of our cash and cash equivalents was held outside of the U.S. in our foreign subsidiaries to be used primarily for our China operations.

Operating Capital Requirements

In the third quarter of 2019, we started generating revenue from commercial sales of roxadustat product in China. Even with the expectation of increases in revenue from product sales, we anticipate that we will continue to generate losses for the foreseeable future. We expect increase in our operating expenses as we continue the development of, and seek regulatory approvals for, our product candidates, and begin to commercialize any approved products. To date, we have funded certain portions of our research and development and manufacturing efforts in China and Europe through outside parties. There is no guarantee that sufficient funds will be available to continue to fund these development efforts through commercialization or otherwise. Although our share of expenses for roxadustat will decrease as a result of AstraZeneca funding all non-China collaboration expenses not reimbursed by Astellas, we expect our research and development expenses to continue to increase as we invest in our other programs. We are subject to all the risks related to the development and commercialization of novel therapeutics, and we may encounter unforeseen expenses, difficulties, complications, delays and other unknown factors that may adversely affect our business, such as from the COVID-19 pandemic or other factors outlined under Part I, Item 1A "*Risk Factors*" in this Annual Report on Form 10-K. We anticipate that we will need substantial additional funding in connection with our continuing operations.

We believe that our existing cash and cash equivalents, short-term and long-term investments and accounts receivable will be sufficient to meet our anticipated cash requirements for at least the next 12 months from the date of this Annual Report on Form 10-K. However, our liquidity assumptions may change over time, and we could utilize our available financial resources sooner than we currently expect. In addition, we may elect to raise additional funds at any time through equity, equity-linked or debt financing arrangements. Our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement and involves risks and uncertainties, and actual results could vary as a result of a number of factors. We have based this estimate on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we currently expect. Our future capital requirements and the adequacy of available funds will depend on many factors, including those set forth under Part I, Item 1A "*Risk Factors*" in this Annual Report on Form 10-K. We may not be able to secure additional financing to meet our operating requirements on acceptable terms, or at all. If we raise additional funds by issuing equity or equity-linked securities, the ownership of our existing stockholders will be diluted. If we raise additional financing by the incurrence of indebtedness, we will be subject to increased fixed payment obligations and could also be subject to restrictive covenants, such as limitations on our ability to incur additional debt, and other operating restrictions that could adversely impact our ability to conduct our business. If we are unable to obtain needed additional funds, we will have to reduce our operating costs and expenses, which would impair our growth prospects and could otherwise negatively impact our business.

Cash Sources and Uses

The following table summarizes the primary sources and uses of cash for the years ended December 31, 2020, 2019 and 2018:

	Years Ended December 31,		
	2020	2019	2018
	(in thousands)		
Net cash provided by (used in):			
Operating activities	$ 81,602	$ (78,705)	$ (76,144)
Investing activities	452,487	120,018	(522,123)
Financing activities	13,343	(4,300)	13,875
Effect of exchange rate changes on cash and cash equivalents	4,695	(5)	(8)
Net increase (decrease) in cash and cash equivalents	$ 552,127	$ 37,008	$ (584,400)

Operating Activities

Net cash used in operating activities was $81.6 million for the year ended December 31, 2020 and consisted primarily of net loss of $189.3 million adjusted for non-cash items of $96.3 million and a net increase in operating assets and liabilities of $174.6 million. The significant non-cash items included stock-based compensation expense of $72.7 million, depreciation expense of $11.7 million, and amortization of finance lease ROU of $10.4 million. The significant items in the changes in operating assets and liabilities included the increases resulting from the following:

- Prepaid expenses and other current assets of $123.5 million and Deferred revenue of $45.1 million, primarily related to the billing and receipt of $130.0 million in regulatory milestones under the Europe Agreement with Astellas associated with the MAA submission in Europe; and the billing and receipt of $50.0 million regulatory milestone under the U.S./RoW Agreement with AstraZeneca associated with the NDA submission for review in the U.S. These milestones were not billable as of December 31, 2019, and was net of the associated deferred revenues of $4.8 million and $50.0 million, respectively. The change in deferred revenue was also driven by the recognition of revenues under our collaboration agreements with Astellas and AstraZeneca;
- Accrued and other liabilities of $31.0 million, primarily driven by $11.5 million of the accrued co-promotion expenses at December 31, 2020 that is anticipated to be paid within the next 12 months resulting from the China Amendment in the third quarter of 2020, $7.0 million of profit share liability to AstraZeneca accrued at December 31, 2020, as well as driven by the timing of invoicing and payment; offset by the payment of $36.3 million that was accrued at December 31, 2019, related to the change in estimated variable consideration associated with the API shipment;
- Accounts payable of $17.7 million, primarily driven by $16.9 million of the co-promotion expenses at December 31, 2020 that is scheduled to be paid to AstraZeneca; and
- Other assets of $6.8 million, primarily related to the return and consumption of input value added tax by FibroGen Beijing.

The increases were partially offset by the decreases resulting from the following:

- Other long-term liabilities of $28.2 million, primarily due to the adjustment in long-term co-promotion expenses payable to AstraZeneca for its sales and marketing efforts related to the commercial sales of roxadustat in China resulting from the China Amendment in the third quarter of 2020;
- Accounts receivable of $12.0 million, primarily driven by the increase in accounts receivable from customers in China for roxadustat sales, as well as the timing of the receipt of upfront payments and the recognition of revenues under our collaboration agreements with Astellas and AstraZeneca; and
- Inventories of $9.2 million, driven by the increased inventory level primarily related to FibroGen Beijing's productions of roxadustat for commercial sales purposes and pre-launch inventory cost capitalized in the U.S.

Net cash used in operating activities was $78.7 million for the year ended December 31, 2019 and consisted primarily of net loss of $77.0 million adjusted for non-cash items of $83.9 million and a net decrease in operating assets and liabilities of $85.7 million. The significant non-cash items included stock-based compensation expense of $66.3 million, depreciation expense of $11.1 million, amortization of finance lease ROU of $10.3 million, and net amortization of premium and discount on investments of $3.7 million. The significant items in the changes in operating assets and liabilities included the decreases resulting from the following:

- Prepaid expenses and other current assets of $128.6 million and deferred revenue of $49.9 million, primarily driven by a $130.0 million unbilled contract asset related to regulatory milestones under the Europe Agreement with Astellas associated with the planned MAA submission in Europe and a $50.0 million contract asset related to a regulatory milestone under the U.S./RoW Agreement with AstraZeneca associated with the NDA submission in the U.S., which were not billable to Astellas or AstraZeneca as of December 31, 2019, net of the associated deferred revenues of $4.8 million and $50.0 million, respectively. The change in deferred revenue was also related to the recognition of revenues under our collaboration agreements with Astellas and AstraZeneca;
- Inventories of $6.9 million, due to the capitalization of inventory costs starting in June 2019 when FibroGen Beijing began productions of roxadustat for commercial sales purposes.
- Other assets of $3.3 million, primarily related to the net accumulation of input value added tax by FibroGen Beijing; and
- Accounts payable of $3.1 million, primarily driven by the timing of invoicing and payments.

The decreases were partially offset by the increases resulting from the following:

- Other long-term liabilities of $52.4 million, primarily due to the accrual of co-promotional expenses with AstraZeneca for sales and marketing efforts related to the commercial launch of roxadustat in China that were not expected to be paid in the next year;
- Accounts receivable of $35.2 million, primarily related to the collection of $43.9 million from Astellas for the API shipment in December 2018 under the Japan Amendment, as well as the timing of the receipt of upfront payments and recognition of revenues under our collaboration agreements with Astellas and AstraZeneca; and
- Accrued and other liabilities of $18.3 million, primarily driven by the accrued $36.3 million related to the change in estimated variable consideration associated with the roxadustat API, offset by the timing of invoicing and payments.

Investing Activities

Investing activities primarily consist of purchases of property and equipment, purchases of investments, and proceeds from the maturity and sale of investments.

Net cash provided by investing activities was $452.5 million for the year ended December 31, 2020 and consisted of proceeds from maturities of investments of $456.9 million, proceeds from sales of available-for-sale securities of $10.6 million, partially offset by cash used in purchases of available-for-sale securities of $8.2 million, purchases of property and equipment of $4.0 million, and net payments of $2.8 million made for investment in Falikang.

Net cash used in investing activities was $120.0 million for the year ended December 31, 2019 and consisted of proceeds from maturities of investments of $537.1 million, partially offset by cash used in purchases of available-for-sale securities and term deposit of $411.3 million, and purchases of property and equipment of $5.8 million.

Financing Activities

Financing activities primarily reflect proceeds from the issuance of our common stock, cash paid for payroll taxes on restricted stock unit releases, repayments of our lease liabilities and obligations.

Net cash provided by financing activities was $13.3 million for the year ended December 31, 2020 and consisted primarily of $37.8 million of proceeds from the issuance of common stock upon exercise of stock options and purchases under ESPP, partially offset by $12.6 million of repayments of finance lease liabilities, $11.5 million of cash paid for payroll taxes on restricted stock unit releases, and $0.4 million of repayments on our lease obligations.

Net cash used in financing activities was $4.3 million for the year ended December 31, 2019 and consisted primarily of $12.8 million of cash paid for payroll taxes on restricted stock unit releases, $11.9 million of repayments of finance lease liabilities, and $0.4 million of repayments on our lease obligations, partially offset by $20.8 million of proceeds from the issuance of common stock upon exercise of stock options and purchases under ESPP.

Off-Balance Sheet Arrangements

During the year ended December 31, 2020, we did not have any relationships with unconsolidated organizations or financial partnerships, such as structured finance or special purpose entities that would have been established for the purpose of facilitating off-balance sheet arrangements.

Indemnification Agreements

We enter into standard indemnification arrangements in the ordinary course of business, including for example, service, manufacturing and collaboration agreements. Pursuant to these arrangements, we indemnify, holds harmless, and agrees to reimburse the indemnified parties for losses suffered or incurred by the indemnified party, including in connection with intellectual property infringement claims by any third party with respect to its technology. The term of these indemnification agreements is generally perpetual any time after the execution of the agreement. We have entered into indemnification agreements with our directors and officers that may require us to indemnify our directors and officers against liabilities that may arise by reason of their status or service as directors or officers to the extent permissible under applicable law. The maximum potential amount of future payments we could be required to make under these arrangements is not determinable. We have never incurred costs to defend lawsuits or settle claims related to these indemnification agreements. As a result, we believe the estimated fair value of these arrangements is minimal.

Contractual Obligations and Commitments

Contractual Obligations

At December 31, 2020, our contractual obligations were as follows:

	Payments Due In				
	Less Than 1 Year	1 - 3 Years	3 - 5 Years	More Than 5 Years	Total
	(in thousands)				
Operating lease liabilities	$ 1,142	$ 982	$ —	$ —	$ 2,124
Finance lease liabilities	13,689	26,412	—	—	40,101
Purchase obligation - Manufacture and supply of roxadustat	14,114	10,951	—	—	25,065
Purchase obligation - Manufacture and supply of pamrevlumab	24,480	33,063	—	—	57,543
Purchase obligation - Other purchases	3,418	—	—	—	3,418
Total contractual obligations	$ 56,843	$ 71,408	$ —	$ —	$ 128,251

The contractual obligations table excludes uncertain tax benefits of approximately $48.6 million that are disclosed in Note 13, *Income Taxes*, to the consolidated financial statements because these uncertain tax positions, if recognized, would be an adjustment to the gross deferred tax assets and the corresponding valuation allowance, if warranted.

Some of our license agreements provide for periodic maintenance fees over specified time periods, as well as payments by us upon the achievement of development, regulatory and commercial milestones. Future milestone payments for research and pre-clinical stage development programs consisted of up to $10.9 million in total potential future milestone payments under our license agreements with Dana-Farber Cancer Institute, University of Miami and Medarex, Inc. These milestone payments generally become due and payable only upon the achievement of certain developmental, clinical, regulatory and/or commercial milestones. The event triggering such payment or obligation has not yet occurred.

Clinical Trials

As of December 31, 2020, we have several on-going clinical studies in various stages. Under agreements with various CROs, and clinical study sites, we incur expenses related to clinical studies of our product candidates and potential other clinical candidates. The timing and amounts of these disbursements are contingent upon the achievement of certain milestones, patient enrollment and services rendered or as expenses are incurred by the CROs or clinical trial sites. Therefore, we cannot estimate the potential timing and amount of these payments and they have been excluded from the table above. Although our material contracts with CROs are cancellable, we have historically not cancelled such contracts.

Product Development Obligations

As of December 31, 2020, our FibroGen Europe Oy ("FibroGen Europe") subsidiary had $11.6 million of principal outstanding and $7.1 million of interest accrued related to the TEKES loans, respectively, which have been included as product development obligations on our consolidated balance sheet.

There is no stated maturity date related to these loans and each loan may be forgiven if the research work funded by TEKES does not result in an economically profitable business or does not meet its technological objectives. In addition, we are not a guarantor of the TEKES loans, and these loans are not repayable by FibroGen Europe until it has distributable funds. We do not expect FibroGen Europe to have such funds for at least the next five years. For the foregoing reasons, we cannot estimate the potential timing and the amounts of repayments (if required) or forgiveness. As a result, the TEKES loans have been excluded from the table above.

Legal Proceedings

We are a party to various legal actions that arose in the ordinary course of our business. We recognize accruals for any legal action when we conclude that a loss is probable and reasonably estimable. On April 20, 2020, in response to an invalidation action brought against certain FibroGen United Kingdom patents by Akebia, the United Kingdom court handed down a decision invalidating United Kingdom designations of European Patent Nos. 1463823, 1633333, 2298301, 2322153, and 2322155. The United Kingdom designation to European Patent No. 2289531 was held to be valid in amended form, but not infringed by Akebia. We and our partner Astellas have filed an appeal of the decision in the United Kingdom Court of Appeal. We did not have any material accruals for any currently active legal action in our consolidated balance sheets as of December 31, 2020, as we could not predict the ultimate outcome of these matters, or reasonably estimate the potential exposure.

Recently Issued and Adopted Accounting Guidance

In August 2018, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("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.* This guidance requires capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). This guidance was effective for annual reporting periods beginning after December 15, 2019, including interim periods. We adopted this guidance on January 1, 2020 using the prospective method, and the adoption of this guidance did not have material impact to our consolidated financial statements.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"). This guidance is intended to provide financial statement users with more decision-useful information about the expected credit losses on financial instruments and other commitments to extend credit held by a reporting entity at each reporting date. This guidance requires the measurement of financial assets with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to inform credit loss estimates. This guidance requires an impairment model, known as the current expected credit loss model, which is based on expected losses rather than incurred losses. Entities are required to carry an allowance for expected credit losses for financial assets, including most debt instruments (except those carried at fair value) and trade receivables. In November 2019, the FASB issued ASU No. 2019-11, *Codification Improvements to Topic 326, Financial Instruments-Credit Losses* ("ASU 2019-11"), which has the same effective dates and transition requirements as ASU 2016-13. ASU 2016-13 and ASU 2019-11 were effective for annual reporting periods beginning after December 15, 2019 including interim periods. Our investment portfolio primarily consists of U.S. Treasury bills and notes carried at fair value, which is required to follow the impairment model under Topic 326. We adopted this guidance on January 1, 2020. Based on the composition of our trade receivables and investment portfolio, economic conditions and historical credit loss activity, the adoption of this guidance did not have material impact to our consolidated financial statements.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

Our management's discussion and analysis of our financial condition and results of operations are based on our financial statements, which have been prepared in accordance with accounting principles generally accepted in the U.S. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, and expenses and the disclosure of contingent assets and liabilities in our financial statements. We evaluate our estimates and judgments on an ongoing basis. We base our estimates on historical experience, known trends and events, and various other factors that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in more detail in the notes to our financial statements appearing elsewhere in this Annual Report, we believe the following accounting policies to be most critical to the judgments and estimates used in the preparation of our financial statements.

Revenue Recognition

Revenues under collaboration agreements

Our collaboration agreements include multiple performance obligations comprised of promised services, or bundles of services, that are distinct. Services that are not distinct are combined with other services in the agreement until they form a distinct bundle of services. Our process for identifying performance obligations and an enumeration of each obligation for each agreement is outlined in Note 4, *Collaboration Agreements and Revenues*, to our consolidated financial statements. Determining the performance obligations within a collaboration agreement often involves significant judgment and is specific to the facts and circumstances contained in each agreement.

We have identified the following material promises under our collaboration agreements: (1) license of FibroGen technology, (2) the performance of co-development services, including manufacturing of clinical supplies and other services during the development period, and (3) manufacture of commercial supply. The evaluation as to whether these promises are distinct, and therefore represent separate performance obligations, is described in more details in Note 4, *Collaboration Agreements and Revenues*, to our consolidated financial statements.

For revenue recognition purposes, we determine that the term of our collaboration agreements begin on the effective date and ends upon the completion of all performance obligations contained in the agreements. In each agreement, the contract term is defined as the period in which parties to the contract have present and enforceable rights and obligations. We believe that the existence of what it considers to be substantive termination penalties on the part of the counterparty create sufficient incentive for the counterparty to avoid exercising its right to terminate the agreement unless in exceptionally rare situations.

The transaction price for each collaboration agreement is determined based on the amount of consideration we expect to be entitled for satisfying all performance obligations within the agreement. Our collaboration agreements include payments to us of one or more of the following: non-refundable upfront license fees; co-development billings; development, regulatory, and commercial milestone payments; payments from sales of API; payments from sales of bulk drug product and royalties on net sales of licensed products.

Upfront license fees are non-contingent and non-refundable in nature and are included in the transaction price at the point when the license fees become due to us. We do not assess whether a contract has a significant financing component if the expectation at contract inception is such that the period between payment by the customer and the transfer of the promised goods or services to the customer will be one year or less.

Co-development billings resulting from our research and development efforts, which are reimbursable under our collaboration agreements, are considered variable consideration. Determining the reimbursable amount of research and development efforts requires detailed analysis of the terms of the collaboration agreements and the nature of the research and development efforts incurred. Determining the amount of variable consideration from co-development billings requires us to make estimates of future research and development efforts, which involves significant judgment. Co-development billings are allocated entirely to the co-development services performance obligation when amounts are related specifically to research and development efforts necessary to satisfy the performance obligation, and such an allocation is consistent with the allocation objective.

Milestone payments are also considered variable consideration, which requires us to make estimates of when achievement of a particular milestone becomes probable. Similar to other forms of variable consideration, milestone payments are included in the transaction price when it becomes probable that such inclusion would not result in a significant revenue reversal. Milestone payments are therefore included in the transaction price when achievement of the milestone becomes probable.

For arrangements that include sales-based royalties and for which the license is deemed to be the predominant item to which the royalties relate, we recognize revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied). To date, we have not recognized any royalty revenue resulting from our collaboration arrangements.

The transaction price is allocated to performance obligations based on their relative standalone selling price (“SSP”), with the exception of co-development billings allocated entirely to co-development services performance obligations. The SSP is determined based on observable prices at which we separately sell the products and services. If an SSP is not directly observable, then we will estimate the SSP considering marketing conditions, entity-specific factors, and information about the customer or class of customer that is reasonably available. The process for determining SSP involves significant judgment and includes consideration of multiple factors, including assumptions related to the market opportunity and the time needed to commercialize a product candidate pursuant to the relevant license, estimated direct expenses and other costs, which include the rates normally charged by contract research and contract manufacturing organizations for development and manufacturing obligations, and rates that would be charged by qualified outsiders for committee services.

Significant judgment may be required in determining whether a performance obligation is distinct, determining the amount of variable consideration to be included in the transaction price, and estimating the SSP of each performance obligation. An enumeration of our significant judgments is outlined in Note 4, *Collaboration Agreements and Revenues*, to our consolidated financial statements.

For each performance obligation identified within an arrangement, we determine the period over which the promised services are transferred and the performance obligation is satisfied. Service revenue is recognized over time based on progress toward complete satisfaction of the performance obligation. For each performance obligation satisfied over time, we assess the proper method to be used for revenue recognition, either an input method to measure progress toward the satisfaction of services or an output method of determining the progress of completion of performance obligation.

Drug product revenue

Drug product revenue includes commercial-grade API or bulk drug product sales to AstraZeneca and Astellas, and is recognized when we fulfill the shipment obligations. The drug product revenue is accounted for as variable consideration, estimated at the time of sale using the expected value method. We apply significant judgment in estimating the variable consideration, which involves the use of significant assumptions such as the future list price adjustments set by the Japanese Ministry of Health, Labour and Welfare, product mix, and timing of processing of API into bulk drug product.

In 2018, FibroGen and Astellas entered into an amendment to the Japan Agreement that allows Astellas to manufacture roxadustat drug product for commercialization in Japan (the "Japan Amendment"). Under this amendment, FibroGen would continue to manufacture and supply roxadustat API to Astellas for the roxadustat commercial launch in Japan. The drug product revenue represents variable consideration and is estimated based on the quantity of product shipped, actual listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and possible future changes to the listed price, adjusted for the timing of and estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk drug product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

Under the Europe Agreement with Astellas, Astellas has an option to purchase roxadustat bulk drug product in support of commercial supplies. The drug product revenue amount represents variable consideration and is estimated based on the quantity of product shipped and an estimated price. The estimated price is based on the contractual transfer price percentage applied on the estimated weighted average net sales price per strength, which is estimated to be realized by Astellas from the end sale of roxadustat in its approved territories.

In 2020, we entered into Commercial Supply Agreement under the U.S./RoW Agreement with AstraZeneca to define general forecast, order, supply and payment terms for AstraZeneca to purchase roxadustat bulk drug product from us in support of commercial supplies. The drug product revenue amount represents variable consideration and was estimated based on the quantity of product shipped and an estimated price. The estimated price is based on the contractual transfer price percentage applied on the estimated weighted average net sales price per strength, which is estimated to be realized by AstraZeneca from the end sale of roxadustat in its approved territories.

The amount of variable consideration that is included in the transaction price may be constrained, and is included in the drug product revenue only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur in a future period when the uncertainty associated with the variable consideration is subsequently resolved. Estimating variable consideration and the related constraint requires the use of significant management judgment. We review new information that may affect its variable consideration estimate at every reporting period and record revenue adjustment, if certain and material. Actual amounts of consideration ultimately received in the future may differ from our estimates, for which we will adjust these estimates and affect the drug product revenue in the period such variances become known.

As each of our collaboration agreements provide for annual true up to the considerations paid for our commercial supplies, we will re-evaluate the transaction price in each reporting period and record an adjustment to revenue as uncertain events are resolved or other changes in circumstances occur.

Product revenue, net

We sell roxadustat in China through a number of pharmaceutical distributors located in China. These pharmaceutical distributors are our customers. Hospitals order roxadustat through a distributor and we ship the product directly to the distributors. The delivery of roxadustat to a distributor represents a single performance obligation. Distributors are responsible for delivering product to end users, primarily hospitals. Distributors bear inventory risk once they receive and accept the product. Product revenue is recognized when control of the promised good is transferred to the customer in an amount that reflects the consideration to which we expect to be entitled to in exchange for the product.

The period between the transfer of control of the promised goods and when we receive payment is based on a general 60-day payment term. As such, product revenue is not adjusted for the effects of a significant financing component.

Product revenue is recorded at the net sales prices (transaction price) which includes the following estimates of variable consideration:

- Price adjustment: In December 2019, China's National Healthcare Security Administration released price guidance for roxadustat under the NRDL, effective January 1, 2020. Any channel inventories as of January 1, 2020 that had not been sold to hospitals by distributors, or to patients by hospitals, were eligible for a price adjustment under the price protection. The price adjustment is calculated based on estimated channel inventory levels at January 1, 2020. If price guidance changes in the future, the price adjustment will be calculated in the same manner;
- Contractual sales rebate: The contractual sales rebate is calculated based on the stated percentage of gross sales by each distributor in the distribution agreement entered between FibroGen and each distributor. The contractual sales rebate is recorded as a reduction to revenue at the point of sale to the distributor;

- Key account hospital sales rebate: An additional sales rebate is provided to a distributor for product sold to key account hospitals as a percentage of gross sales made by the distributor to eligible hospitals. This additional rebate is recorded as a reduction to revenue at the point of sale to the distributor;
- Transfer fee discount: The transfer fee discount is offered to a distributor who has its downstream distributors supply to eligible hospitals. This discount is calculated based on a percentage of gross sales made to the downstream distributors, and recorded as a reduction to revenue as incurred;
- Sales return: Distributors can request to return product to us only due to quality issues or for product purchased within one year prior to the product's expiration date; and
- Non-key account hospital listing award: A one-time fixed-amount award is offered to a distributor who successfully lists the product with an eligible hospital, and who meets certain requirements. We consider this particular award to be an upfront payment to a customer within the definitions of ASC 606. The non-key account hospital listing award is capitalized when the distributor meets eligibility requirements, and amortized as reduction to product revenue over future sales orders made by the distributor until exhausted.

The calculation of the above variable consideration is based on gross sales to the distributor, or estimated utilizing best available information from the distributor, maximum known exposures and other available information including estimated channel inventory levels and estimated sales made by the distributor to hospitals, which involve a substantial degree of judgment.

The above rebates and discounts all together are eligible to be applied against the distributor's future sales order, limited to certain maximums until such rebates and discounts are exhausted. These rebates and discounts are recorded as contract liabilities at the time they become eligible and in the same period that the related revenue is recorded. Due to the distributor's legal right to offset, at each balance sheet date, the rebates and discounts are presented as reductions to gross accounts receivable from the distributor, or as a current liability to the distributor to the extent that the total amount exceeds the gross accounts receivable or when we expect to settle the discount in cash. The distributor's legal right of offset is calculated at the individual distributor level.

Valuation of inter-company transfer of intellectual property

ASU 2016-16, *Income Taxes (Topic 740), Intra-Entity Transfers of Assets Other Than Inventory,* issued by the FASB requires companies to recognize the income tax consequences of an inter-company transfer of assets when the transfer occurs. The guidance in ASU 2016-16 does not change accounting for the pre-tax effects of inter-company asset transfers under Accounting Standards Codification Topic 810, *Consolidation.*

As described in Note 13, *Income Taxes*, to our consolidated financial statements, during 2020, we transferred certain intellectual property rights relating to our Chinese business between our wholly owned subsidiaries that are based in different tax jurisdictions. The transferor entity was not subject to income taxes in its local jurisdiction. The acquiring entity of the intellectual property is entitled to amortize the acquisition price of the intangible assets for tax purposes. In accordance with ASU 2016-16, we recognized a deferred tax asset of $78.7 million for the temporary difference arising from the acquirer's excess tax basis. Furthermore, based upon the weight of available evidence, we recognized a full valuation allowance against this deferred tax asset since we do not currently believe that realization of this gross deductible temporary difference is more likely than not.

The estimated fair value for the transfer of these intellectual property rights was determined using the excess earning method, a variation of the income valuation approach. The excess earnings method estimates the value of an intangible asset equal to the present value of the incremental after-tax cash flows attributable to that intangible asset over its remaining economic life. Long-term cash flow projections for the asset require the use of significant estimates and judgements, including revenue volume and price. The fair value of the asset was determined using an estimated discount rate of 12.3%, which reflects the risks inherent in future cash flow projections and represents a rate of return that a market participant would expect for this asset. The transferred intangible asset is being amortized over an estimated useful life of approximately 8 years by the acquiring entity. We believe our assumptions are consistent with the plans and estimates that a market participant would use to acquire this intangible asset.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISKS

We are exposed to market risk in the ordinary course of our business. Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. Our market risk exposure is primarily a result of fluctuations in foreign currency exchange rates. Most of our revenue from collaboration agreements are denominated in U.S. dollars, and therefore our revenue is not currently subject to significant foreign currency risk. The functional currency of our FibroGen Europe Oy subsidiary is the local currency. On April 1, 2020, our subsidiary FibroGen Beijing changed its functional currency from U.S. dollars to its local currency. Our operating expenses are denominated in the currencies of the countries in which our operations are located, which are primarily in the United States, China, and Europe. Our consolidated results of operations and cash flows are, therefore, subject to fluctuations due to changes in foreign currency exchange rates and may be adversely affected in the future due to changes in foreign exchange rates.

As of December 31, 2020, we did not have material financial assets and liabilities denominated in foreign currencies that are subject to fluctuation in the exchange rate with the U.S. dollar. Therefore, the effect of a hypothetical 10% change in foreign currency exchange rates would not have resulted in a material net gain or loss on foreign currency for the year ended December 31, 2020.

The primary objective of our investment activities is to preserve our capital to fund our operations. We also seek to maximize income from our cash and cash equivalents without assuming significant risk. To achieve our objectives, we invest our non-operating cash and cash equivalents primarily in U.S. treasuries and money market funds as of December 31, 2020. Given the nature of our investments as of December 31, 2020, we believe that our exposure to interest rate risk is not significant. We actively monitor changes in interest rates.

To date, we have not entered into any hedging arrangements with respect to foreign currency risk or other derivative financial instruments.

ITEM 8. CONSOLIDATED FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of FibroGen, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of FibroGen, Inc. and its subsidiaries (the "Company") as of December 31, 2020 and 2019, and the related consolidated statements of operations, of comprehensive loss, of changes in stockholders' equity and of cash flows for each of the three years in the period ended December 31, 2020, including the related notes and financial statement schedule listed in the accompanying index (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2020, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company did not maintain, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO because material weaknesses in internal control over financial reporting existed as of that date related to the risk assessment component of internal control, as the Company did not design and maintain an effective risk assessment process at a precise enough level to identify new and evolving risks of material misstatement to the financial statements as a result of changes in the Company's business operation, which gave rise to additional material weaknesses as the Company did not design and maintain effective controls related to the timely identification of shipments associated with drug product revenue, or changes in estimated variable consideration related to drug product revenue.

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 the annual or interim financial statements will not be prevented or detected on a timely basis. The material weaknesses referred to above are described in Management's Annual Report on Internal Control over Financial Reporting appearing under Item 9A. We considered these material weaknesses in determining the nature, timing, and extent of audit tests applied in our audit of the 2020 consolidated financial statements, and our opinion regarding the effectiveness of the Company's internal control over financial reporting does not affect our opinion on those consolidated financial statements.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for leases in 2019.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting included in management's report referred to above. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

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 (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) 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 (iii) 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.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Deferred Tax Asset – Valuation of Intellectual Property Rights

As described in Notes 2 and 13 to the consolidated financial statements, in 2020, the Company transferred certain intellectual property rights relating to its Chinese business. Management estimated the fair value of the intellectual property rights using the excess earning method. The transaction resulted in the recognition of a deferred tax asset in the amount of $78.7 million. The establishment of a deferred tax asset from the intra-entity transfer of intangible assets required management to make significant estimates and assumptions to determine the fair value of intellectual property rights transferred which include, but are not limited to, management's expectations of discount rate, revenue volume and price.

The principal considerations for our determination that performing procedures relating to the valuation of intellectual property rights is a critical audit matter are the significant judgment by management when estimating the fair value of the intellectual property rights, which in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating management's significant assumptions related to discount rate, revenue volume and price. Also, the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls over management's valuation of intellectual property rights. These procedures also included, among others (i) reading the intellectual property license agreement and (ii) testing management's process for estimating the fair value of intellectual property rights, which included (a) evaluating the appropriateness of the valuation method used, (b) testing the completeness, accuracy, and relevance of the data used in the method, and (c) evaluating the reasonableness of management's significant assumptions relating to discount rate, revenue volume and price. Evaluating the reasonableness of the revenue volume and price assumptions involved considering the current performance of the business and evaluating management's forecasts. Professionals with specialized skill and knowledge were used to assist in the evaluation of valuation method and discount rate used to value the intellectual property rights.

Revenue Recognition – Estimates in Variable Consideration for Active Pharmaceutical Ingredients Sales

As described in Notes 2 and 4 to the consolidated financial statements, the Company recognizes revenue from sales to its collaboration partners for the shipment of bulk drug product. The revenue from customers under these arrangements are accounted for as variable consideration, estimated at the time of sale using the expected value method. Revenue recognized under these arrangements was $8.9 million for the year ended December 31, 2020. Management applied significant judgment in estimating the variable consideration, which involved the use of significant assumptions such as (i) the future list price adjustments set by the Japanese Ministry of Health, Labour and Welfare, (ii) product mix, and (iii) timing of processing of active pharmaceutical ingredient (API) into bulk drug product.

The principal considerations for our determination that performing procedures relating to estimates in variable consideration for active pharmaceutical ingredients sales is a critical audit matter are the significant judgment by management in estimating the variable consideration, which in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating management's significant assumptions related to the future list price adjustments, product mix and timing of processing of API into bulk drug product. As described in the "Opinions on the Financial Statements and Internal Control over Financial Reporting" section, a material weakness was identified related to this matter.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included, among others, testing management's process for estimating the variable consideration, which included (a) evaluating the appropriateness of the expected value method, (b) evaluating the reasonableness of management's significant assumptions related to future list price adjustments, product mix, and timing of processing of API into bulk drug product, and (c) testing the completeness, accuracy, and relevance of underlying data. Evaluating management's assumption related to future list price adjustments involved evaluating whether the assumption was reasonable considering historical price list changes and industry data. Evaluating management's assumptions related to product mix and timing of processing of API into bulk drug product involved evaluating whether the assumptions were reasonable considering current and historical manufacturing levels and mix and other external data.

/s/ PricewaterhouseCoopers LLP
San Jose, California
March 1, 2021

We have served as the Company's auditor since 2000.

FIBROGEN, INC.
CONSOLIDATED BALANCE SHEETS
(In thousands, except per share amounts)

	December 31, 2020	December 31, 2019
Assets		
Current assets:		
Cash and cash equivalents	$ 678,393	$ 126,266
Short-term investments	8,144	407,491
Accounts receivable, net ($4,127 and $4,845 from a related party)	41,883	28,455
Inventories	16,530	6,887
Prepaid expenses and other current assets ($889 and $125,210 from related parties)	10,160	133,391
Total current assets	755,110	702,490
Restricted time deposits	2,072	2,072
Long-term investments	244	61,118
Property and equipment, net	33,647	42,743
Finance lease right-of-use assets	29,606	39,602
Equity method investment in unconsolidated variable interest entity	2,728	—
Other assets	3,433	9,372
Total assets	$ 826,840	$ 857,397
Liabilities, stockholders' equity and non-controlling interests		
Current liabilities:		
Accounts payable ($1,118 and $0 to a related party)	$ 24,789	$ 6,088
Accrued and other current liabilities ($24 and $36,883 to a related party)	119,521	83,816
Deferred revenue ($2,907 and $249 to a related party)	6,547	490
Finance lease liabilities, current	12,330	12,351
Total current liabilities	163,187	102,745
Product development obligations	18,697	16,780
Deferred revenue, net of current ($4,636 and $125 to a related party)	138,474	99,449
Finance lease liabilities, non-current	25,391	37,610
Other long-term liabilities	39,642	65,407
Total liabilities	385,391	321,991
Commitments and Contingencies (Note 9)		
Stockholders' equity:		
Preferred stock, $0.01 par value; 125,000 shares authorized; no shares issued and outstanding at December 31, 2020 and 2019	—	—
Common stock, $0.01 par value; 225,000 shares authorized at December 31, 2020 and 2019; 91,441 and 87,657 shares issued and outstanding at December 31, 2020 and 2019	914	877
Additional paid-in capital	1,399,774	1,300,725
Accumulated other comprehensive loss	(4,499)	(747)
Accumulated deficit	(974,011)	(784,720)
Total stockholders' equity	422,178	516,135
Non-controlling interests	19,271	19,271
Total equity	441,449	535,406
Total liabilities, stockholders' equity and non-controlling interests	$ 826,840	$ 857,397

The accompanying notes are an integral part of these Consolidated Financial Statements.

FIBROGEN, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share amounts)

	Years Ended December 31,		
	2020	2019	2018
Revenue:			
License revenue (includes $14,323, $129,405 and $14,323 from a related party)	$ 14,323	$ 177,086	$ 22,269
Development and other revenue (includes $19,174, $29,393 and $20,903 from a related party)	80,592	114,115	125,913
Product revenue, net	72,498	1,700	—
Drug product revenue (includes $4,281, $(36,324) and $64,776 from a related party)	8,906	(36,324)	64,776
Total revenue	176,319	256,577	212,958
Operating costs and expenses:			
Cost of goods sold	8,869	1,147	—
Research and development	252,924	209,265	235,839
Selling, general and administrative	106,406	135,479	63,812
Total operating costs and expenses	368,199	345,891	299,651
Loss from operations	(191,880)	(89,314)	(86,693)
Interest and other, net			
Interest expense	(2,402)	(2,876)	(10,991)
Investment loss in unconsolidated variable interest entity	(202)	—	—
Interest income and other, net	5,553	15,548	11,568
Total interest and other, net	2,949	12,672	577
Loss before income taxes	(188,931)	(76,642)	(86,116)
Provision for income taxes	360	328	304
Net loss	$ (189,291)	$ (76,970)	$ (86,420)
Net loss per share - basic and diluted	$ (2.11)	$ (0.89)	$ (1.03)
Weighted average number of common shares used to calculate net loss per share - basic and diluted	89,854	86,633	84,062

The accompanying notes are an integral part of these Consolidated Financial Statements.

FIBROGEN, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands)

	Years Ended December 31,		
	2020	**2019**	**2018**
Net income (loss)	$ (189,291)	$ (76,970)	$ (86,420)
Other comprehensive income (loss):			
Foreign currency translation adjustments **(Note 2)**	(3,207)	331	771
Available-for-sale investments:			
Unrealized gain (loss) on investments, net of tax effect	(545)	592	(7)
Other comprehensive income (loss), net of taxes	(3,752)	923	764
Comprehensive income (loss)	$ (193,043)	$ (76,047)	$ (85,656)

The accompanying notes are an integral part of these Consolidated Financial Statements.

FIBROGEN, INC.
CONSOLIDATED STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY
(In thousands, except share data)

	Common Stock		Additional Paid-in	Accumulated Other Comprehensive	Accumulated	Non Controlling	
	Shares	Amount	Capital	Loss	Deficit (Note 2)	Interests	Total
Balance at December 31, 2017	82,498,128	$ 825	$ 1,160,094	$ (1,795)	$ (630,657)	$ 19,271	$ 547,738
Impact of change in accounting principle upon adoption of ASU 2016-01 **(Note 2)**	—	—	—	(1,250)	1,250	—	—
Net loss	—	—	—	—	(86,420)	—	(86,420)
Change in unrealized gain or loss on investments	—	—	—	(7)	—	—	(7)
Foreign currency translation adjustments	—	—	—	771	—	—	771
Adjustment to issuance costs for Follow-on Offerings	—	—	11	—	—	—	11
Shares issued from stock plans, net of payroll taxes paid	2,933,974	29	14,206	—	—	—	14,235
Stock-based compensation	—	—	52,142	—	—	—	52,142
Balance at December 31, 2018	85,432,102	854	1,226,453	(2,281)	(715,827)	19,271	528,470
Impact of adoption of ASC 842 **(Note 2)**	—	—	—	—	8,688	—	8,688
Impact of change in accounting principle upon adoption of ASU 2018-02 **(Note 2)**	—	—	—	611	(611)	—	—
Net loss	—	—	—	—	(76,970)	—	(76,970)
Change in unrealized gain or loss on investments	—	—	—	592	—	—	592
Foreign currency translation adjustments	—	—	—	331	—	—	331
Shares issued from stock plans, net of payroll taxes paid	2,220,957	23	7,939	—	—	—	7,962
Warrants exercised	4,430	—	66	—	—	—	66
Stock-based compensation	—	—	66,267	—	—	—	66,267
Balance at December 31, 2019	87,657,489	877	1,300,725	(747)	(784,720)	19,271	535,406
Net loss	—	—	—	—	(189,291)	—	(189,291)
Change in unrealized gain or loss on investments	—	—	—	(545)	—	—	(545)
Foreign currency translation adjustments	—	—	—	(3,207)	—	—	(3,207)
Shares issued from stock plans, net of payroll taxes paid	3,783,144	37	26,329	—	—	—	26,366
Stock-based compensation	—	—	72,720	—	—	—	72,720
Balance at December 31, 2020	91,440,633	$ 914	$ 1,399,774	$ (4,499)	$ (974,011)	$ 19,271	$ 441,449

The accompanying notes are an integral part of these Consolidated Financial Statements.

FIBROGEN, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	Years Ended December 31,		
	2020	2019	2018
Operating activities			
Net loss	$ (189,291)	$ (76,970)	$ (86,420)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation	11,678	11,147	6,562
Amortization of finance lease right-of-use assets	10,369	10,307	—
Net accretion of discount on investments	103	(3,667)	(42)
Unrealized loss (gain) on equity investments	—	(88)	1,120
Investment loss in unconsolidated variable interest entity	202	—	—
Loss (gain) on disposal of property and equipment	933	(42)	53
Stock-based compensation	72,720	66,267	52,142
Realized foreign currency gain	—	—	(1,074)
Realized loss (gain) on sales of available-for-sale securities	258	—	(87)
Changes in operating assets and liabilities:			
Accounts receivable, net ($718, $42,365 and $(43,486) from a related party)	(11,973)	35,229	(55,232)
Inventories	(9,175)	(6,887)	—
Prepaid expenses and other current assets ($124,321, $(125,210) and $0 from a related party)	123,492	(128,598)	(129)
Other assets	6,843	(3,253)	1,090
Accounts payable ($1,118, $0 and $0 from a related party)	17,731	(3,051)	3,630
Accrued and other liabilities ($(36,859), $36,439 and $172 from a related party)	31,048	18,288	5,606
Deferred revenue ($7,169, $(3,137) and $(3,908) from a related party)	45,077	(49,941)	(5,031)
Lease obligations	—	—	32
Accrued interest for finance lease liabilities	(177)	194	—
Other long-term liabilities	(28,236)	52,360	1,636
Net cash provided by (used in) operating activities	81,602	(78,705)	(76,144)
Investing activities			
Purchases of property and equipment	(3,994)	(5,762)	(8,020)
Payment made for investment in unconsolidated variable interest entity	(3,896)	—	—
Proceeds from equity transfer of unconsolidated variable interest entity	1,063	—	—
Proceeds from sale of property and equipment	—	7	184
Purchases of available-for-sale securities and term deposit	(8,192)	(411,299)	(576,880)
Proceeds from sales of available-for-sale securities	10,606	—	8,167
Proceeds from maturities of investments	456,900	537,072	54,426
Net cash provided by (used in) investing activities	452,487	120,018	(522,123)
Financing activities			
Borrowings under capital lease obligations	—	—	49
Repayments of capital lease obligations	—	—	(6)
Repayments of finance lease liabilities	(12,620)	(11,925)	—
Repayments of lease obligations	(403)	(403)	(403)
Cash paid for payroll taxes on restricted stock unit releases	(11,463)	(12,750)	(15,612)
Proceeds from issuance of common stock	37,829	20,778	29,847
Net cash provided by (used in) financing activities	13,343	(4,300)	13,875
Effect of exchange rate change on cash and cash equivalents	4,695	(5)	(8)
Net increase (decrease) in cash and cash equivalents	552,127	37,008	(584,400)
Total cash and cash equivalents at beginning of period	126,266	89,258	673,658
Total cash and cash equivalents at end of period	$ 678,393	$ 126,266	$ 89,258
Supplemental cash flow information:			
Interest payments	$ 135	$ 174	$ 218
Balance in accounts payable and accrued liabilities related to purchases of property and equipment	884	460	276
Deferred offering costs recorded in accounts payable and accrued liabilities	$ —	$ —	$ 24

The accompanying notes are an integral part of these Consolidated Financial Statements.

1. The Company

FibroGen, Inc. ("FibroGen" or the "Company") is headquartered in San Francisco, California, with subsidiary offices in Beijing and Shanghai, People's Republic of China ("China"). FibroGen is a leading biopharmaceutical company developing and commercializing a pipeline of first-in-class therapeutics. The Company applies its pioneering expertise in hypoxia-inducible factor ("HIF") biology, 2-oxoglutarate enzymology, connective tissue growth factor ("CTGF") biology, and clinical development to advance innovative medicines for the treatment of anemia, fibrotic disease, and cancer.

Roxadustat, FibroGen's most advanced product, is an oral small molecule inhibitor of HIF prolyl hydroxylase activity that has received marketing authorization in China (tradename: 爱瑞卓®) for the treatment of anemia caused by chronic kidney disease ("CKD") in dialysis and non-dialysis patients. EVRENZO® (roxadustat) is also approved in Japan and Chile for the treatment of anemia associated with CKD in dialysis and non-dialysis patients.

The Company's New Drug Application ("NDA") filing in the United States ("U.S.") for roxadustat for the treatment of anemia in dialysis and non-dialysis CKD patients was submitted in December 2019 to the U.S. Food and Drug Administration ("FDA"). In December 2020, the FDA extended the review period of the NDA by three months for FibroGen to submit additional analyses of existing roxadustat clinical data, and set a new Prescription Drug User Fee Act goal date of March 20, 2021. On March 1, 2021, the FDA informed us that the Cardiovascular and Renal Drugs Advisory Committee will hold an advisory committee meeting to review the NDA for roxadustat. The date of the advisory committee meeting has not been set. As a result of this communication, we will not receive an approval decision by the PDUFA goal date. In Europe, the Marketing Authorization Application ("MAA") filing for roxadustat for the treatment of anemia in dialysis and non-dialysis CKD patients was accepted for regulatory review by the European Medicines Agency ("EMA") in May 2020 and Astellas expects an approval decision by the EMA mid-2021.

Roxadustat is in Phase 3 clinical development in the U.S. and Europe and in Phase 3 development in China for anemia associated with myelodysplastic syndromes. Roxadustat is in Phase 2 clinical development for chemotherapy-induced anemia.

Pamrevlumab, an anti-CTGF human monoclonal antibody, is in Phase 3 clinical development for the treatment of idiopathic pulmonary fibrosis, locally advanced unresectable pancreatic cancer and Duchenne muscular dystrophy.

2. Summary of Significant Accounting Policies

Basis of Presentation

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the U.S. ("U.S. GAAP"). The consolidated financial statements include the accounts of the Company, its wholly owned subsidiaries and its majority-owned subsidiaries, FibroGen Europe and FibroGen China Anemia Holdings, Ltd. ("FibroGen Cayman"). All inter-company transactions and balances have been eliminated in consolidation. For any variable interest entity for which FibroGen is not the primary beneficiary, the Company uses the equity method of accounting.

The Company operates in one segment — the discovery, development and commercialization of novel therapeutics to treat serious unmet medical needs.

Variable Interest Entity

Under the Accounting Standards Codification ("ASC") 810, *Consolidation* ("ASC 810"), when the Company obtains an economic interest in an entity, it evaluates the entity to determine if it should be deemed a variable interest entity ("VIE"), and, if so, whether the Company is the primary beneficiary and is therefore required to consolidate the VIE, based on significant judgment whether the Company (i) has the power to direct the activities that most significantly impact the economic performance of the VIE and (ii) has the obligation to absorb losses or the right to receive benefits of the VIE that could potentially be significant to the VIE.

On an ongoing basis, the Company re-evaluates the VIE assessment based on potential changes in facts and circumstances, including but not limited to, the shareholder loans to the entity and the execution of any future significant agreements between the entity and its shareholders and/or other third parties.

Foreign Currency Translation

The reporting currency of the Company and its subsidiaries is the U.S. dollar.

The functional currency of FibroGen Europe is the Euro. The assets and liabilities of FibroGen Europe are translated to U.S. dollars at exchange rates in effect at the balance sheet date. All income statement accounts are translated at monthly average exchange rates. Resulting foreign currency translation adjustments are recorded directly in accumulated other comprehensive income (loss) as a separate component of stockholders' equity.

Prior to April 1, 2020, the functional currency of the Company's subsidiary, FibroGen (China) Medical Technology Development Co., Ltd. ("FibroGen Beijing"), was the U.S. dollar. Accordingly, monetary assets and liabilities of FibroGen Beijing in the currencies other than U.S. dollar were remeasured using exchange rates in effect at the end of the period. Revenues and costs in its local currency, Renminbi Yuan ("CNY"), were remeasured using average exchange rates for the period, except for costs related to those balance sheet items that were remeasured using historical exchange rates. The resulting remeasurement gains and losses were included within interest income and other, net in the consolidated statements of operations as incurred.

On April 1, 2020, FibroGen Beijing adopted CNY as its functional currency based on reassessment of the primary economic operational environment of FibroGen Beijing that is mainly associated with its growing manufacturing and product sales activities conducted in CNY. As such, monetary assets and liabilities of FibroGen Beijing in currencies other than CNY are remeasured using exchange rates in effect at the end of the period. The assets and liabilities of FibroGen Beijing are translated to U.S. dollars at exchange rates in effect at the balance sheet date. All income statement accounts are translated at monthly average exchange rates. Resulting foreign currency translation adjustments are recorded directly in accumulated other comprehensive income (loss) as a separate component of stockholders' equity. This change in FibroGen Beijing's functional currency was accounted for prospectively from April 1, 2020, and the prior consolidated financial statements were not restated. The related currency translation adjustment was $1.3 million at April 1, 2020 upon adoption.

The functional currency of FibroGen, Inc. and all other subsidiaries is the U.S. dollar. Accordingly, monetary assets and liabilities in the non-functional currency of these subsidiaries are remeasured using exchange rates in effect at the end of the period. Revenues and costs in local currency are remeasured using average exchange rates for the period, except for costs related to those balance sheet items that are remeasured using historical exchange rates. The resulting remeasurement gains and losses are included within interest income and other, net in the consolidated statements of operations as incurred and have not been material for all periods presented.

Use of Estimates

The preparation of the consolidated financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and reported amounts of revenues and expenses during the reporting period. The more significant areas requiring the use of management estimates and assumptions include valuation and recognition of revenue. On an ongoing basis, management reviews these estimates and assumptions. Changes in facts and circumstances may alter such estimates and actual results could differ from those estimates.

Concentration of Credit Risk

The Company is subject to risks associated with concentration of credit for cash and cash equivalents. Outside of short-term operating needs, the majority of cash on hand is invested in U.S. treasuries and money market funds. Any remaining cash is deposited with major financial institutions in the U.S., Finland, China and the Cayman Islands. At times, such deposits may be in excess of insured limits. The Company has not experienced any loss on its deposits of cash and cash equivalents. Included in current assets are significant balances of accounts receivable as follows:

	December 31,	
	2020	2019
Astellas Pharma Inc. (“Astellas”)—Related party	10%	17%
AstraZeneca AB (“AstraZeneca”)	26%	81%

The Company started selling roxadustat in China since late 2019 through a growing number of pharmaceutical distributors located in China. As of December 31, 2019, the aggregate accounts receivable from distributors was immaterial. As of December 31, 2020, along with the growing roxadustat sales in China, the aggregate accounts receivable from distributors represented 64% of the consolidated accounts receivable, with no material balance from any individual distributor.

Other Risks and Uncertainties

The Company’s business is subject to risks and uncertainties, including those related to COVID-19 and the related shelter-in-place, stay-at-home and other similar governmental orders issued in response to the COVID-19 pandemic.

The Company’s future results of operations involve a number of risks and uncertainties. Factors that could affect the Company’s future operating results and cause actual results to vary materially from expectations include, but are not limited to, rapid technological change, obtaining second source suppliers, regulatory approval from the FDA or other regulatory authorities, the results of clinical trials and the achievement of milestones, market acceptance of the Company’s product candidates, competition from other products and larger companies, protection of proprietary technology, strategic relationships and dependence on key individuals.

Starting in the first quarter of 2020, the Company experienced slower enrollment in its clinical trials due to the interruption caused by COVID-19 in the worldwide healthcare system. The future impact of the COVID-19 pandemic on the Company’s business is highly uncertain and difficult to predict. The COVID-19 pandemic may continue to affect enrollment in and initiation of the Company’s clinical trials, and could affect the Company’s supply chain if further social distancing and other business restrictions are put in place by various government entities, particularly in China and the U.S. COVID-19 may affect the health of the Company’s employees limiting the Company’s productivity. The COVID-19 pandemic may also impact the market for the Company’s products and product candidates in the future, affecting sales of the Company’s products. Such possible risks and uncertain impacts from the COVID-19 pandemic could have a material adverse effect on the Company’s drug development, commercialization revenues, and other portions of its business, and in particular, could impact the Company’s assumptions of accounts receivable collectability, fair value measurements of investments, liquidity, and development costs. The extent of the pandemic’s effect on the Company’s operational and financial performance will depend in large part on future developments, particularly with respect to the scope and severity of the pandemic, governmental restrictions put in place to fight the pandemic, and the development of vaccines and treatments for COVID-19. Due to the inherent uncertainty of the unprecedented and rapidly evolving situation, the Company is unable to estimate the likely impact of the COVID-19 pandemic on its future operations.

Cash, Cash Equivalents and Restricted Time Deposits

The Company considers all highly liquid investments with maturities of three months or less and that are used in the Company’s cash management activities at the date of purchase to be cash equivalents. Cash and cash equivalents also include money market accounts and various deposit accounts. Restricted time deposits include an irrevocable standby letter of credit as security deposit for a long-term property lease with the Company’s landlord. Restricted time deposits as of December 31, 2020 and 2019 totaled $2.1 million and $2.1 million, respectively. As of December 31, 2020 and 2019, a total of $66.0 million and $11.9 million, respectively, of the Company’s cash and cash equivalents was held outside of the U.S. in the Company’s foreign subsidiaries to be used primarily for the Company’s China operations.

Investments

As of December 31, 2020, the Company's investments consist of diversified bond funds and marketable equity investments. Those investments with original maturities of greater than three months and remaining maturities of less than 12 months (365 days) are considered short-term investments. Those investments with maturities greater than 12 months (365 days) from the balance sheet date are considered long-term investments. When such investments are held, the Company's investments classified as available-for-sale are recorded at fair value based upon quoted market prices at period end. Unrealized gains and losses for available-for-sale debt investments that are deemed temporary in nature are recorded in accumulated other comprehensive income (loss) as a separate component of stockholder' equity. Marketable equity securities are equity securities with readily determinable fair value, and are measured and recorded at fair value. Realized and unrealized gains or losses resulting from changes in value and sale of the Company's marketable equity investments are recorded in other income (expenses) in the consolidated statement of operations.

A decline in the fair value of any security below cost that is deemed other than temporary results in a charge to earnings and the corresponding establishment of a new cost basis for the security. Premiums and discounts are amortized (accreted) over the life of the related security as an adjustment to its yield. Dividend and interest income are recognized when earned. Realized gains and losses are included in earnings and are derived using the specific identification method for determining the cost of investments sold.

Fair Value of Financial Instruments

Carrying amounts of certain of the Company's financial instruments including cash equivalents, investments, receivables, accounts payable and accrued liabilities approximate fair value (refer to Note 5, *Fair Value Measurements*).

Trade accounts receivable

The allowance for doubtful accounts is based on the Company's assessment of the collectability of customer accounts. The Company makes estimates of expected credit losses for the allowance for doubtful accounts by considering factors such as historical experience, credit quality, the age of the accounts receivable balances, current economic and regulatory conditions that may affect a customer's ability to pay, and estimates of expected future losses. The Company's bad debt expense for the years ended December 31, 2020, 2019 and 2018 and the allowance for doubtful accounts as of December 31, 2020 and 2019 were immaterial.

Credit losses – Available-for-sale debt securities

The Company periodically assesses its available-for-sale investments for other-than-temporary impairment. For debt securities in an unrealized loss position, the Company first considers its intent to sell, or whether it is more likely than not that the Company will be required to sell the debt securities before recovery of their amortized cost basis. If either of these criteria are met, the amortized cost basis of such debt securities is written down to fair value through interest and other, net.

For debt securities in an unrealized loss position that do not meet the aforementioned criteria, the Company assesses whether the decline in the fair value of such debt securities has resulted from credit losses or other factors. The Company considers the extent to which fair value is less than amortized cost, any changes to the rating of the security by a rating agency, and any adverse conditions specifically related to the securities, among other factors. If this assessment indicates that a credit loss may exist, the Company then compares the present value of cash flows expected to be collected from such securities to their amortized cost basis. If the present value of cash flows expected to be collected is less than the amortized cost basis, a credit loss exists and an allowance for credit losses is recorded through interest and other, net, limited by the amount that the fair value is less than the amortized cost basis. Any additional impairment not recorded through an allowance for credit losses is recognized in other comprehensive income.

Changes in the allowance for credit losses are recorded as provision for, or reversal of, credit loss expense. Losses are charged against the allowance when the Company believes that an available-for-sale security is confirmed uncollectable or when either of the criteria regarding intent or requirement to sell is met.

Inventories

Inventories are stated at the lower of cost or net realizable value, on a first-in, first-out, or FIFO, basis. The cost of the Company's inventories in China is determined using full absorption and standard costing method. The Company reviews the standard cost of raw materials, work-in-process and finished goods annually and more often as appropriate to ensure that its inventories approximate current actual cost. The cost of the Company's inventories in the U.S. uses actual costs to determine its cost basis. The cost of inventories includes direct material cost, direct labor and manufacturing overhead.

When the technical feasibility of the Company's future commercialization is considered probable and the future economic benefit is expected to be realized, based on management's judgment, the Company capitalizes pre-launch inventory costs prior to regulatory approval. A number of factors are considered, including the status in the validation process in significant jurisdictions, regulatory application and approval process, and terms and condition for future sale of such inventory or future alternative use. The pre-launch inventory cost includes purchase cost of raw materials, cost paid to contract manufacturers for inventory manufacturing, freight and custom charges, and certain direct internal labor and overhead expenses.

The Company periodically reviews its inventories to identify obsolete, slow-moving, excess or otherwise unsaleable items. If obsolete, excess or unsaleable items are observed and there are no alternate uses for the inventory, an inventory valuation adjustment is recorded through a charge to cost of goods sold on the Company's consolidated statements of operations. The establishment of inventory valuation reserves, together with the calculation of the amount of such reserves, requires judgment including consideration of many factors, such as estimates of future product demand and product expiration period, among others.

Property and Equipment

Property and equipment are recorded at cost and depreciated over their estimated useful lives using the straight-line method. Computer equipment, laboratory equipment, machinery and furniture and fixtures are depreciated over three to five years. Leasehold improvements are recorded at cost and amortized over the term of the lease or their useful life, whichever is shorter.

Leases

The Company determines if an arrangement is or contains a lease at inception date when it is given control of the underlying assets. The Company elected the practical expedient not to apply the lease recognition and measurement requirements to short-term leases, which is any lease with a term of 12 months or less as of the commencement date that does not include an option to purchase the underlying asset that the lessee is reasonably certain to exercise.

The Company's building leases previously accounted for as build-to-suit arrangements prior to the adoption of Accounting Standards Codification ("ASC") 842 - *Leases* ("ASC 842") are accounted for as finance leases under the requirements of ASC 842.

Lease right-of-use ("ROU") assets and lease liabilities are recognized based on the present value of the future minimum lease payments over the lease term at commencement date. As its leases do not typically provide an implicit rate, the Company uses its incremental borrowing rate based on the information available at commencement date in determining the present value of future payments. The Company reassesses the incremental borrowing rate periodically for application to any new leases or lease modifications, which approximates the rate at which the Company would borrow, on a secured basis, in the country where the lease was executed.

Lease ROU assets include any lease payments made and initial direct costs incurred. The Company has lease agreements with lease and non-lease components. The Company generally accounts for each lease component separately from the non-lease components, and excludes all non-lease components from the calculation of minimum lease payments in measuring the ROU asset and lease liability.

The Company's lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise that option. Lease expense for minimum lease payments is recognized on a straight-line basis over the lease terms.

Regarding leases denominated in a foreign currency, the related ROU assets and the corresponding ROU asset amortization costs are remeasured using the exchange rate in effect at the date of initial recognition; the related lease liabilities are remeasured using the exchange rate in effect at the end of the reporting period; the lease costs and interest expenses related to lease liability accretion are remeasured using average exchange rates for the reporting period.

Finance leases are included in finance lease ROU assets, finance lease liabilities, current and non-current on the Company's consolidated balance sheets. Operating leases are included in other assets, accrued and other current liabilities, and other long-term liabilities on the Company's consolidated balance sheets.

Impairment of Long-Lived Assets

The Company continually evaluates whether events or circumstances have occurred that indicate that the estimated remaining useful life of its long-lived assets may warrant revision or that the carrying value of these assets may be impaired. If the Company determines that an impairment trigger has been met, the Company evaluates the realizability of its long-lived assets based on a comparison of projected undiscounted cash flows from use and eventual disposition with the carrying value of the related asset. Any write-downs (which are measured based on the difference between the fair value and the carrying value of the asset) are treated as permanent reductions in the carrying amount of the assets (asset group). Based on this evaluation, the Company believes that, as of each of the balance sheet dates presented, none of the Company's long-lived assets were impaired. The Company's impairment of long-lived assets for the years ended December 31, 2020, 2019 and 2018 were immaterial.

Revenue Recognition

Revenues under collaboration agreements

The Company's collaboration agreements include multiple performance obligations comprised of promised services, or bundles of services, that are distinct. Services that are not distinct are combined with other services in the agreement until they form a distinct bundle of services. The Company's process for identifying performance obligations and an enumeration of each obligation for each agreement is outlined in Note 4, *Collaboration Agreements and Revenues*. Determining the performance obligations within a collaboration agreement often involves significant judgment and is specific to the facts and circumstances contained in each agreement.

The Company has identified the following material promises under its collaboration agreements: (1) license of FibroGen technology, (2) the performance of co-development services, including manufacturing of clinical supplies and other services during the development period, and (3) manufacture of commercial supply. The evaluation as to whether these promises are distinct, and therefore represent separate performance obligations, is described in more details in Note 4, *Collaboration Agreements and Revenues*.

For revenue recognition purposes, the Company determines that the term of its collaboration agreements begin on the effective date and ends upon the completion of all performance obligations contained in the agreements. In each agreement, the contract term is defined as the period in which parties to the contract have present and enforceable rights and obligations. The Company believes that the existence of what it considers to be substantive termination penalties on the part of the counterparty create sufficient incentive for the counterparty to avoid exercising its right to terminate the agreement unless in exceptionally rare situations.

The transaction price for each collaboration agreement is determined based on the amount of consideration the Company expects to be entitled for satisfying all performance obligations within the agreement. The Company's collaboration agreements include payments to the Company of one or more of the following: non-refundable upfront license fees; co-development billings; development, regulatory, and commercial milestone payments; payments from sales of active pharmaceutical ingredient ("API"); payments from sales of bulk drug product and royalties on net sales of licensed products.

Upfront license fees are non-contingent and non-refundable in nature and are included in the transaction price at the point when the license fees become due to the Company. The Company does not assess whether a contract has a significant financing component if the expectation at contract inception is such that the period between payment by the customer and the transfer of the promised goods or services to the customer will be one year or less.

Co-development billings resulting from the Company's research and development efforts, which are reimbursable under its collaboration agreements, are considered variable consideration. Determining the reimbursable amount of research and development efforts requires detailed analysis of the terms of the collaboration agreements and the nature of the research and development efforts incurred. Determining the amount of variable consideration from co-development billings requires the Company to make estimates of future research and development efforts, which involves significant judgment. Co-development billings are allocated entirely to the co-development services performance obligation when amounts are related specifically to research and development efforts necessary to satisfy the performance obligation, and such an allocation is consistent with the allocation objective.

Milestone payments are also considered variable consideration, which requires the Company to make estimates of when achievement of a particular milestone becomes probable. Similar to other forms of variable consideration, milestone payments are included in the transaction price when it becomes probable that such inclusion would not result in a significant revenue reversal. Milestone payments are therefore included in the transaction price when achievement of the milestone becomes probable.

For arrangements that include sales-based royalties and for which the license is deemed to be the predominant item to which the royalties relate, the Company recognizes revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied). To date, the Company has not recognized any royalty revenue resulting from its collaboration arrangements.

The transaction price is allocated to performance obligations based on their relative standalone selling price ("SSP"), with the exception of co-development billings allocated entirely to co-development services performance obligations. The SSP is determined based on observable prices at which the Company separately sells the products and services. If an SSP is not directly observable, then the Company will estimate the SSP considering marketing conditions, entity-specific factors, and information about the customer or class of customer that is reasonably available. The process for determining SSP involves significant judgment and includes consideration of multiple factors, including assumptions related to the market opportunity and the time needed to commercialize a product candidate pursuant to the relevant license, estimated direct expenses and other costs, which include the rates normally charged by contract research and contract manufacturing organizations for development and manufacturing obligations, and rates that would be charged by qualified outsiders for committee services.

Significant judgment may be required in determining whether a performance obligation is distinct, determining the amount of variable consideration to be included in the transaction price, and estimating the SSP of each performance obligation. An enumeration of the Company's significant judgments is outlined in Note 4, *Collaboration Agreements and Revenues*.

For each performance obligation identified within an arrangement, the Company determines the period over which the promised services are transferred and the performance obligation is satisfied. Service revenue is recognized over time based on progress toward complete satisfaction of the performance obligation. For each performance obligation satisfied over time, the Company assesses the proper method to be used for revenue recognition, either an input method to measure progress toward the satisfaction of services or an output method of determining the progress of completion of performance obligation.

Drug product revenue

Drug product revenue includes commercial-grade API or bulk drug product sales to AstraZeneca and Astellas, and is recognized when the Company fulfills the shipment obligations. The drug product revenue is accounted for as variable consideration, estimated at the time of sale using the expected value method. The Company applies significant judgment in estimating the variable consideration, which involves the use of significant assumptions such as the future list price adjustments set by the Japanese Ministry of Health, Labour and Welfare, product mix, and timing of processing of API into bulk drug product.

In 2018, FibroGen and Astellas entered into an amendment to the Japan Agreement that allows Astellas to manufacture roxadustat drug product for commercialization in Japan (the "Japan Amendment"). Under this amendment, FibroGen would continue to manufacture and supply roxadustat API to Astellas for the roxadustat commercial launch in Japan. The drug product revenue represents variable consideration and is estimated based on the quantity of product shipped, actual listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and possible future changes to the listed price, adjusted for the timing of and estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk drug product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

Under the Europe Agreement with Astellas, Astellas has an option to purchase roxadustat bulk drug product in support of commercial supplies. The drug product revenue amount represents variable consideration and was estimated based on the quantity of product shipped and an estimated price. The estimated price is based on the contractual transfer price percentage applied on the estimated weighted average net sales price per strength, which is estimated to be realized by Astellas from the end sale of roxadustat in its approved territories.

In 2020, the Company entered into Commercial Supply Agreement under the U.S./RoW Agreement with AstraZeneca to define general forecast, order, supply and payment terms for AstraZeneca to purchase roxadustat bulk drug product from FibroGen in support of commercial supplies. The drug product revenue amount represents variable consideration and was estimated based on the quantity of product shipped and an estimated price. The estimated price is based on the contractual transfer price percentage applied on the estimated weighted average net sales price per strength, which is estimated to be realized by AstraZeneca from the end sale of roxadustat in its approved territories.

The amount of variable consideration that is included in the transaction price may be constrained, and is included in the drug product revenue only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur in a future period when the uncertainty associated with the variable consideration is subsequently resolved. Estimating variable consideration and the related constraint requires the use of significant management judgment. The Company reviews new information that may affect its variable consideration estimate at every reporting period and record revenue adjustment, if certain and material. Actual amounts of consideration ultimately received in the future may differ from the Company's estimates, for which the Company will adjust these estimates and affect the drug product revenue in the period such variances become known. The amount constrained as of December 31, 2020 was $6.0 million related to the drug product shipment to Astellas under the Europe Agreement in the fourth quarter of 2020.

As each of the Company's collaboration agreements provide for annual true up to the considerations paid for its commercial supplies, the Company will re-evaluate the transaction price in each reporting period and record adjustment to revenue as uncertain events are resolved or other changes in circumstances occur.

Product revenue, net

The Company sells roxadustat in China through a number of pharmaceutical distributors located in China. These pharmaceutical distributors are the Company's customers. Hospitals order roxadustat through a distributor and the Company ships the product directly to the distributors. The delivery of roxadustat to a distributor represents a single performance obligation. Distributors are responsible for delivering product to end users, primarily hospitals. Distributors bear inventory risk once they receive and accept the product. Product revenue is recognized when control of the promised good is transferred to the customer in an amount that reflects the consideration to which the Company expects to be entitled to in exchange for the product.

The period between the transfer of control of the promised goods and when the Company receives payment is based on a general 60-day payment term. As such, product revenue is not adjusted for the effects of a significant financing component.

Product revenue is recorded at the net sales prices (transaction price) which includes the following estimates of variable consideration:

- Price adjustment: In December 2019, China's National Healthcare Security Administration released price guidance for roxadustat under the National Reimbursement Drug List ("NRDL"), effective January 1, 2020. Any channel inventories as of January 1, 2020 that had not been sold to hospitals by distributors, or to patients by hospitals, were eligible for a price adjustment under the price protection. The price adjustment is calculated based on estimated channel inventory levels at January 1, 2020. If price guidance changes in the future, the price adjustment will be calculated in the same manner;
- Contractual sales rebate: The contractual sales rebate is calculated based on the stated percentage of gross sales by each distributor in the distribution agreement entered between FibroGen and each distributor. The contractual sales rebate is recorded as a reduction to revenue at the point of sale to the distributor;
- Key account hospital sales rebate: An additional sales rebate is provided to a distributor for product sold to key account hospitals as a percentage of gross sales made by the distributor to eligible hospitals. This additional rebate is recorded as a reduction to revenue at the point of sale to the distributor;
- Transfer fee discount: The transfer fee discount is offered to a distributor who has its downstream distributors supply to eligible hospitals. This discount is calculated based on a percentage of gross sales made to the downstream distributors, and recorded as a reduction to revenue as incurred;

- Sales return: Distributors can request to return product to the Company only due to quality issues or for product purchased within one year prior to the product's expiration date; and

- Non-key account hospital listing award: A one-time fixed-amount award is offered to a distributor who successfully lists the product with an eligible hospital, and who meets certain requirements. The Company considers this particular award to be an upfront payment to a customer within the definitions of ASC 606. The non-key account hospital listing award is capitalized when the distributor meets eligibility requirements, and amortized as reduction to product revenue over future sales orders made by the distributor until exhausted.

The calculation of the above variable consideration is based on gross sales to the distributor, or estimated utilizing best available information from the distributor, maximum known exposures and other available information including estimated channel inventory levels and estimated sales made by the distributor to hospitals, which involve a substantial degree of judgment.

The above rebates and discounts all together are eligible to be applied against the distributor's future sales order, limited to certain maximums until such rebates and discounts are exhausted. These rebates and discounts are recorded as contract liabilities at the time they become eligible and in the same period that the related revenue is recorded. Due to the distributor's legal right to offset, at each balance sheet date, the liability for rebates and discounts are presented as reductions of gross accounts receivable from the distributor, or as a current liability to the distributor to the extent that the total amount exceeds the gross accounts receivable or when the Company expects to settle the discount in cash. The distributor's legal right of offset is calculated at the individual distributor level.

Research and Development Expenses

Research and development expenses consist of independent research and development costs and the gross amount of costs associated with work performed under collaboration agreements. Research and development costs include employee-related expenses, expenses incurred under agreements with clinical research organizations, other clinical and preclinical costs and allocated direct and indirect overhead costs, such as facilities costs, information technology costs and other overhead. All research and development costs are expensed as incurred.

Clinical Trial Accruals

Clinical trial costs are a component of research and development expenses. The Company accrues and expenses clinical trial activities performed by third parties based upon actual work completed in accordance with agreements established with clinical research organizations and clinical sites. The Company determines the costs to be recorded based upon validation with the external service providers as to the progress or stage of completion of trials or services and the agreed-upon fee to be paid for such services.

Selling, General and Administrative Expenses

Selling, general and administrative ("SG&A") expenses consist primarily of employee-related expenses for executive, operational, finance, legal, compliance and human resource functions. SG&A expenses also include facility-related costs, professional fees, accounting and legal services, other outside services including co-promotional expenses, recruiting fees and expenses associated with obtaining and maintaining patents.

Income Taxes

The Company utilizes the asset and liability method of accounting for income taxes, which requires the recognition of deferred tax assets and liabilities for expected future consequences of temporary differences between the financial reporting and income tax bases of assets and liabilities using enacted tax rates. Management makes estimates, assumptions and judgments to determine the Company's provision for income taxes and for deferred tax assets and liabilities, and any valuation allowances recorded against the Company's deferred tax assets. The Company assesses the likelihood that its deferred tax assets will be recovered from future taxable income and, to the extent the Company believes that recovery is not likely, the Company must establish a valuation allowance.

The calculation of the Company's current provision for income taxes involves the use of estimates, assumptions and judgments while taking into account current tax laws, interpretation of current tax laws and possible outcomes of future tax audits. The Company has established reserves to address potential exposures related to tax positions that could be challenged by tax authorities. Although the Company believes its estimates, assumptions and judgments to be reasonable, any changes in tax law or its interpretation of tax laws and the resolutions of potential tax audits could significantly impact the amounts provided for income taxes in the Company's consolidated financial statements.

The calculation of the Company's deferred tax asset balance involves the use of estimates, assumptions and judgments while taking into account estimates of the amounts and type of future taxable income. Actual future operating results and the underlying amount and type of income could differ materially from the Company's estimates, assumptions and judgments thereby impacting the Company's financial position and results of operations.

During 2020, the Company transferred certain intellectual property rights relating to its Chinese business between its wholly owned subsidiaries that are based in different tax jurisdictions. Refer to Note 13, *Income Taxes*, for more information. The establishment of a deferred tax asset from the intra-entity transfer of intangible assets required the Company to make significant estimates and assumptions to determine the fair value of intellectual property rights transferred, which include but are not limited to, its expectations of discount rate, revenue volume and price. The accuracy of these estimates could be affected by unforeseen events or actual results, and the sustainability of the Company's future tax benefits is dependent upon the acceptance of these valuation estimates and assumptions by the taxing authorities.

The Company has adopted ASC 740-10, *Accounting for Uncertainty in Income Taxes*, that prescribes a recognition threshold and measurement attribute for the financial statement recognition and measurement of uncertain tax positions taken or expected to be taken in the Company's income tax return, and also provides guidance on derecognition, classification, interest and penalties, accounting in interim periods, disclosure and transition.

The Company includes interest and penalties related to unrecognized tax benefits within income tax expense in the Consolidated Statements of Operations.

Stock-Based Compensation

The Company maintains equity incentive plans under which incentive and nonqualified stock options are granted to employees and non-employee consultants. Compensation expense relating to non-employee stock options has not been material for all the periods presented.

The Company measures and recognizes compensation expense for all stock options and restricted stock units ("RSUs") granted to its employees and directors based on the estimated fair value of the award on the grant date. The Company uses the Black-Scholes valuation model to estimate the fair value of stock option awards. The fair value is recognized as expense, net of estimated forfeitures, over the requisite service period, which is generally the vesting period of the respective award, on a straight-line basis. The Company believes that the fair value of stock options granted to non-employees is more reliably measured than the fair value of the services received. The determination of the grant date fair value of options using an option pricing model is affected by the Company's estimated Common Stock fair value and requires management to make a number of assumptions including the expected life of the option, the volatility of the underlying stock, the risk-free interest rate and expected dividends.

Comprehensive Income (Loss)

The Company is required to report all components of comprehensive income (loss), including net loss, in the consolidated financial statements in the period in which they are recognized. Comprehensive income (loss) is defined as the change in equity during a period from transactions and other events and circumstances from non-owner sources, including unrealized gains and losses on investments and foreign currency translation adjustments. Comprehensive gains (losses) have been reflected in the consolidated statements of comprehensive income (loss) for all periods presented.

Recently Issued and Adopted Accounting Guidance

In August 2018, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("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.* This guidance requires capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). This guidance was effective for annual reporting periods beginning after December 15, 2019, including interim periods. The Company adopted this guidance on January 1, 2020 using the prospective method, and the adoption of this guidance did not have material impact to the Company's consolidated financial statements.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"). This guidance is intended to provide financial statement users with more decision-useful information about the expected credit losses on financial instruments and other commitments to extend credit held by a reporting entity at each reporting date. This guidance requires the measurement of financial assets with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to inform credit loss estimates. This guidance requires an impairment model, known as the current expected credit loss model, which is based on expected losses rather than incurred losses. Entities are required to carry an allowance for expected credit losses for financial assets, including most debt instruments (except those carried at fair value) and trade receivables. In November 2019, the FASB issued ASU No. 2019-11, *Codification Improvements to Topic 326, Financial Instruments-Credit Losses* ("ASU 2019-11"), which has the same effective dates and transition requirements as ASU 2016-13. ASU 2016-13 and ASU 2019-11 were effective for annual reporting periods beginning after December 15, 2019 including interim periods. The Company's investment portfolio primarily consists of U.S. Treasury bills and notes carried at fair value, which is required to follow the impairment model under Topic 326. The Company adopted this guidance on January 1, 2020. Based on the composition of the Company's trade receivables and investment portfolio, economic conditions and historical credit loss activity, the adoption of this guidance did not have material impact to the Company's consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, *Leases (Topic 842).* The Company adopted the lease guidance under ASC 842 as of January 1, 2019, using the modified retrospective transition method, through a cumulative-effect adjustment. The adoption of this guidance resulted in a reduction of $8.7 million to the Company's accumulated deficit and also impacted various balance sheet line items in its consolidated balance sheet as of January 1, 2019 upon adoption. The adoption of this guidance did not have a material impact to the Company's consolidated statement of operations or consolidated statement of cash flows for the year ended December 31, 2019.

In February 2018, the FASB issued ASU 2018-02, *Income Statement - Reporting Comprehensive Income: Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income*. The Company adopted this guidance on January 1, 2019 using the modified retrospective approach, with a reduction of $0.6 million to its accumulated other comprehensive loss and an increase of $0.6 million to its accumulated deficit as of January 1, 2019 upon adoption. The adoption of this guidance had no impact to the Company's consolidated statement of operations or consolidated statement of cash flows for the year ended December 31, 2019.

In January 2016, the FASB issued ASU 2016-01, *Financial Instruments-Overall (Subtopic 825-10)*. The Company adopted this guidance as of January 1, 2018 using the modified retrospective approach, with an increase of $1.3 million to its accumulated other comprehensive loss and a reduction of $1.3 million to its accumulated deficit as of January 1, 2018 upon adoption. The adoption of this guidance had no impact to the Company's consolidated statement of cash flows for the year ended December 31, 2018.

Recently Issued Accounting Guidance Not Yet Adopted

In March 2020, the FASB issued ASU 2020-04, *Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting* ("ASU 2020-04"), which provides companies with optional financial reporting alternatives to reduce the cost and complexity associated with the accounting for contracts and hedging relationships affected by reference rate reform. This guidance is effective as of March 12, 2020 through December 31, 2022. Subsequently in January 2021, the FASB issued ASU 2021-01, *Reference Rate Reform (Topic 848): Scope*, which clarifies ASU 2020-04 and provides certain optional expedients that allow derivative instruments impacted by changes in the interest rate used for margining, discounting or contract price alignment to qualify for certain optional relief. ASU 2021-01 is effective in the same timeframe as ASU 2020-04. The relief offered by this guidance, if adopted, is available to companies for the period March 12, 2020 through December 31, 2022. The Company has certain lease arrangements that are linked to LIBOR. The Company is in the process of evaluating options for transitioning away from LIBOR and expects to complete by the time LIBOR is phased out. The Company did not elect to apply any of the expedients or exceptions as of and for the year ended December 31, 2020 and is currently evaluating the impact on its consolidated financial statements and related disclosures upon adoption of this guidance.

In December 2019, the FASB issued ASU No. 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes*. This guidance simplifies the accounting for income taxes by clarifying and amending existing guidance related to the recognition of franchise tax, the evaluation of a step up in the tax basis of goodwill, and the effects of enacted changes in tax laws or rates in the effective tax rate computation, among other clarifications. This guidance is effective for annual reporting periods beginning after December 15, 2020 including interim periods, with early adoption permitted. The Company does not plan to early adopt this guidance and does not anticipate a material impact to its consolidated financial statements upon adoption of this guidance.

3. Acquisition and Variable Interest Entity

On July 8, 2020, FibroGen Cayman, FibroGen Beijing, and FibroGen International (Hong Kong) Limited (collectively, "FibroGen China") and AstraZeneca entered into an amendment, effective July 1, 2020, to the collaboration agreement for the development and commercialization (but not manufacture) of roxadustat for the treatment of anemia in China ("China Agreement"), relating to the development and commercialization of roxadustat in China (the "China Amendment").

The China Amendment provides for the establishment of a jointly owned entity that will perform roxadustat distribution, as well as conduct sales and marketing through AstraZeneca. To prepare for the establishment of this jointly owned entity, in July 2020, FibroGen Beijing acquired 100% of the outstanding shares of Beijing Kangda Yongfu Pharmaceutical Co., LTD ("Kangda") in exchange for cash consideration of CNY15.0 million (approximately $2.1 million). The purpose of the acquisition was to acquire a distribution license owned by Kangda for commercializing and distributing roxadustat in China. FibroGen Beijing continues to hold all of the regulatory licenses issued by China regulatory authorities and continues to be primarily responsible for regulatory, clinical, manufacturing, medical affairs and pharmacovigilance. The transaction costs related to the execution of the acquisition, primarily legal expenses, totaled CNY5.0 million and were shared equally with AstraZeneca. Therefore, the acquisition costs for FibroGen Beijing were CNY2.5 million (approximately $0.4 million).

Under the ASU No. 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business*, the Company determined that the all of the value of Kangda was attributable to the acquired license, and therefore the transaction was accounted for as an asset acquisition. The Company allocated the entire purchase price of $2.5 million to the acquired license that was recorded as an intangible asset, to be amortized over the duration of expected sales of roxadustat. There was no excess consideration over the estimated fair value. Through September 15, 2020, Kangda was consolidated as a wholly owned subsidiary of the Company. The amortization of the license was immaterial during the short period of time before Kangda was deconsolidated upon the establishment of the jointly owned entity described below.

On September 15, 2020, FibroGen Beijing and AstraZeneca entered into an equity transfer agreement and shareholders agreement, under which FibroGen Beijing sold 48.9% of the outstanding shares of Kangda to AstraZeneca in exchange for cash consideration of CNY7.3 million (approximately $1.0 million). Concurrently with the equity transfer, the two parties renamed Kangda to Beijing Falikang Pharmaceutical Co. Ltd. ("Falikang"). Following the sale, FibroGen Beijing owns 51.1% of the outstanding shares of Falikang. The gain (loss) resulting from the equity transfer was immaterial.

In addition, based on the shareholders' resolutions of Falikang, in December 2020, FibroGen Beijing made cash contribution of CNY8.9 million (approximately $1.4 million) to Falikang, representing 51.1% of Falikang's registered capital of CNY17.5 million. AstraZeneca completed its cash contribution of 48.9% of Falikang's registered capital in December 2020 as well.

Pursuant to the guidance under ASC 810, the Company concluded that Falikang qualifies as a VIE. As Falikang is a distribution entity for roxadustat and AstraZeneca is the final decision maker for all the roxadustat commercialization activities, the Company lacks the power criterion while AstraZeneca meets both the power and economic criteria under ASC 810, to direct the activities of Falikang that most significantly impact its performance. Therefore, the Company is not the primary beneficiary of this VIE. As a result, the Company accounted for its investment in Falikang under the equity method, and Falikang is not consolidated into the Company's consolidated financial statements. Accordingly, The Company recorded its total investments in Falikang of CNY19.2 million (approximately $2.8 million), which is the total of the 51.1% of Falikang's equity and the acquisition costs, as an investment in unconsolidated subsidiary in other assets in the consolidated balance sheet. In addition, the Company recognized its proportionate share of the reported profits or losses of Falikang, beginning September 15, 2020, as other income (loss) in the consolidated statement of operations, and as an adjustment to its investment in unconsolidated subsidiary in the consolidated balance sheet. Falikang has not incurred material profit or loss to date. The Company may be required to provide shareholder loans to Falikang to meet necessary financial obligations as part of its operations. To date, these loans have been immaterial.

The Company's equity method investment in Falikang was as follows for the year ended December 31, 2020 (in thousands):

Entity	Ownership Percentage	Balance at December 31, 2019	Additions	Share of Net Loss	Currency Translation	Balance at December 31, 2020
Falikang	51.1%	$ —	$ 2,825	$ (202)	$ 105	$ 2,728

Falikang is considered as a related party to the Company. See Note 14, *Related Party Transactions*, for related disclosures.

On an ongoing basis, the Company will re-evaluate the VIE assessment based on changes in facts and circumstances, including but not limited to, the shareholder loans received by Falikang and the execution of any future significant agreements between Falikang and its shareholders and/or other third parties.

The Company will assess the impairment of its equity method investment whenever events or changes in circumstances indicate that a decrease in value of the investment has occurred that is other than temporary.

4. Collaboration Agreements and Revenues

Astellas Agreements

Japan Agreement

In June 2005, the Company entered into a collaboration agreement with Astellas for the development and commercialization (but not manufacture) of roxadustat for the treatment of anemia in Japan ("Japan Agreement"). Under this agreement, Astellas paid license fees and other consideration totaling $40.1 million (such amounts were fully received as of February 2009). Under the Japan Agreement, the Company is also eligible to receive from Astellas an aggregate of approximately $132.5 million in potential milestone payments, comprised of (i) up to $22.5 million in milestone payments upon achievement of specified clinical and development milestone events (such amounts were fully received as of July 2016), (ii) up to $95.0 million in milestone payments upon achievement of specified regulatory milestone events, and (iii) up to approximately $15.0 million in milestone payments upon the achievement of specified commercial sales milestone. The Japan Agreement also provides for tiered payments based on net sales of product (as defined) in the low 20% range of the list price published by the Japanese Ministry of Health, Labour and Welfare, adjusted for certain elements, after commercial launch. The aggregate amount of the considerations received under the Japan Agreement, through December 31, 2020 totals $105.1 million, excluding drug product revenue that is discussed separately below.

During the fourth quarter of 2020, the Japanese Ministry of Health, Labour and Welfare approved EVRENZO® (roxadustat) for the treatment of anemia of CKD in adult patients not on dialysis. This approval triggered a $15.0 million milestone payable to the Company by Astellas under the Japan Agreement. Accordingly, the consideration of $15.0 million associated with this milestone was included in the transaction price and allocated to performance obligations under the Japan Agreement in the fourth quarter of 2020, substantially all of which was recognized as revenue during the year ended December 31, 2020 from performance obligations satisfied or partially satisfied.

In September 2019, the Japanese Ministry of Health, Labour and Welfare approved EVRENZO® (generic name: roxadustat; tradename EVRENZO® in Japan) for the treatment of anemia associated with CKD in dialysis patients. This approval triggered a $12.5 million milestone payable to the Company by Astellas under the Japan Agreement. Accordingly, the consideration of $12.5 million associated with this milestone was included in the transaction price and allocated to performance obligations under the Japan Agreement in the third quarter of 2019, substantially all of which was recognized as revenue during the year ended December 31, 2019 from performance obligations satisfied or partially satisfied.

During the second quarter of 2018, Astellas reported positive results from the final phase 3 CKD-dialysis trial of roxadustat in Japan, indicating that Astellas was ready to make an NDA submission for the treatment of anemia with roxadustat in CKD-dialysis patients in 2018. The Company evaluated the regulatory milestone payment associated with NDA submission in Japan based on variable consideration requirements under the current revenue standards and concluded that this milestone became probable of being achieved in the second quarter of 2018. Accordingly, the consideration of $15.0 million associated with this milestone was included in the transaction price and allocated to performance obligations under the Japan Agreement in the second quarter of 2018, substantially all of which was recognized as revenue during the year ended December 31, 2018 from performance obligations satisfied or partially satisfied.

In 2018, FibroGen and Astellas entered into an amendment to the Japan Agreement that allows Astellas to manufacture roxadustat drug product for commercialization in Japan (the “Japan Amendment”). Under this amendment, FibroGen would continue to manufacture and supply roxadustat API to Astellas for the roxadustat commercial launch in Japan. The commercial terms of the Japan Agreement relating to the transfer price for roxadustat for commercial use remain substantially the same, reflecting an adjustment for the manufacture of drug product by Astellas rather than FibroGen. The Company fulfilled shipment obligations under the term of the Japan Amendment in the second quarter of 2020 and in 2018. The related drug product revenue, as described in details under *Drug Product Revenue* section below, were $4.3 million, $(36.3) million and $64.8 million in the years ended December 31, 2020, 2019 and 2018, respectively.

Europe Agreement

In April 2006, the Company entered into a separate collaboration agreement with Astellas for the development and commercialization of roxadustat for the treatment of anemia in Europe, the Middle East, the Commonwealth of Independent States and South Africa (“Europe Agreement”). Under the terms of the Europe Agreement, Astellas paid license fees and other upfront consideration totaling $320.0 million (such amounts were fully received as of February 2009). The Europe Agreement also provides for additional development and regulatory approval milestone payments up to $425.0 million, comprised of (i) up to $90.0 million in milestone payments upon achievement of specified clinical and development milestone events (such amounts were fully received as of 2012), (ii) up to $335.0 million in milestone payments upon achievement of specified regulatory milestone events. Under the Europe Agreement, Astellas committed to fund 50% of joint development costs for Europe and North America, and all territory-specific costs. The Europe Agreement also provides for tiered payments based on net sales of product (as defined) in the low 20% range. The aggregate amount of the considerations received under the Europe Agreement through December 31, 2020 totals $540.0 million, excluding drug product revenue that is discussed separately below.

During the second quarter of 2019, the Company received positive topline results from analyses of pooled major adverse cardiovascular event (“MACE”) and MACE+ data from its Phase 3 trials evaluating roxadustat as a treatment for dialysis and non-dialysis CKD patients, enabling Astellas to prepare for an MAA submission to the EMA in the second quarter of 2020, following the Company’s NDA submission to the FDA that was accepted for review in February 2020. The Company evaluated the two regulatory milestone payments associated with the planned MAA submission and concluded that these milestones became probable of being achieved in the second quarter of 2019. Accordingly, the total consideration of $130.0 million associated with these milestones was included in the transaction price and allocated to performance obligations under the Europe Agreement in the second quarter of 2019, of which $128.8 million was recognized as revenue during the year ended December 31, 2019 and $0.8 million was recognized as revenue during the year ended December 31, 2020, from performance obligations satisfied or partially satisfied. According to the Europe Agreement, these milestone payments are billable to Astellas upon the submission of an MAA, therefore this $130.0 million was an unbilled contract asset as of December 31, 2019, and billed to Astellas upon the submission of an MAA in the second quarter of 2020 with the total $130.0 million received during the same quarter.

In the fourth quarter of 2018, the Company was engaged in the final stages of review with its partners over the proposed development of roxadustat for the treatment of chemotherapy-induced anemia ("CIA"). AstraZeneca and Astellas approved the program in December 2018 and January 2019, respectively. Costs associated with the development of this indication are expected to be shared 50-50 between the Company's two partners. For revenue recognition purposes, the Company concluded that this new indication represents a modification to the Europe agreements and will be accounted for separately, meaning the development costs associated with the new indications are distinct from the original development costs. The development service period for roxadustat for the treatment of CIA under the Europe Agreement is estimated to continue through the second quarter of 2024 to allow for development of this indication.

Under the Europe Agreement, Astellas has an option to purchase roxadustat bulk drug product in support of commercial supplies. The Company fulfilled a shipment obligation under the term of the Europe Amendment in the fourth quarter of 2020, as described in details under *Drug Product Revenue* section below.

AstraZeneca Agreements

U.S./Rest of World ("RoW") Agreement

Effective July 30, 2013, the Company entered into a collaboration agreement with AstraZeneca for the development and commercialization of roxadustat for the treatment of anemia in the U.S. and all other countries in the world, other than China, not previously licensed under the Astellas Europe and Astellas Japan Agreements ("U.S./RoW Agreement"). It also excludes China, which is covered by a separate agreement with AstraZeneca described below. Under the terms of the U.S./RoW Agreement, AstraZeneca paid upfront, non-contingent, non-refundable and time-based payments totaling $374.0 million (such amounts were fully received as of June 2016). Under the U.S./RoW Agreement, the Company is also eligible to receive from AstraZeneca an aggregate of approximately $875.0 million in potential milestone payments, comprised of (i) up to $65.0 million in milestone payments upon achievement of specified clinical and development milestone events, (ii) up to $325.0 million in milestone payments upon achievement of specified regulatory milestone events, (iii) up to $160.0 million in milestone payments related to activity by potential competitors and (iv) up to approximately $325.0 million in milestone payments upon the achievement of specified commercial sales events. The aggregate amount of the considerations received under the U.S./RoW Agreement through December 31, 2020 totals $439.0 million, excluding drug product revenue that is discussed separately below.

Under the U.S./RoW Agreement, the Company and AstraZeneca will share equally in the development costs of roxadustat not already paid for by Astellas, up to a total of $233.0 million (i.e. the Company's share of development costs is $116.5 million, which was reached in 2015). Development costs incurred by FibroGen during the development period in excess of the $233.0 million (aggregated spend) are fully reimbursed by AstraZeneca. AstraZeneca will pay the Company tiered royalty payments on AstraZeneca's future net sales (as defined in the agreement) of roxadustat in the low 20% range. In addition, the Company will receive a transfer price for shipment of commercial product based on a percentage of AstraZeneca's net sales (as defined in the agreement) in the low- to mid-single digit range.

As mentioned above, during the second quarter of 2019, the Company received positive topline results from analyses of pooled MACE and MACE+ data from its Phase 3 trials for roxadustat, enabling the Company's NDA submission to the FDA. The Company evaluated the regulatory milestone payment associated with this planned NDA submission and concluded that this milestone became probable of being achieved in the second quarter of 2019. Accordingly, the consideration of $50.0 million associated with this milestone was included in the transaction price and allocated to performance obligations under the combined arrangement in the second quarter of 2019, of which $42.4 million was recognized as revenue during the year ended December 31, 2019 and $0.6 million was recognized as revenue during the year ended December 31, 2020, from performance obligations satisfied or partially satisfied. The Company submitted such NDA in December 2019, which was accepted by FDA in February 2020. According to the U.S/RoW Agreement, this milestone payment is billable to AstraZeneca when the NDA is accepted by the FDA, therefore this $50.0 million was an unbilled contract asset as of December 31, 2019, and was billed during the first quarter of 2020, the payment of which was fully received in April 2020.

As mentioned above, AstraZeneca and Astellas approved the development of roxadustat for the treatment of CIA in December 2018 and January 2019, respectively. Costs associated with the development of this indication are expected to be shared 50/50 between AstraZeneca and Astellas. In addition, in December 2018, anemia of chronic inflammation and multiple myeloma was approved for development by AstraZeneca and is expected to be fully funded by them. For revenue recognition purposes, the Company concluded that the addition of these new indications represents a modification to the collaboration agreements and will be accounted for separately, meaning the development costs associated with the new indications are distinct from the original development costs. The development service period for roxadustat for the treatment of CIA, anemia of chronic inflammation and multiple myeloma under the AstraZeneca agreements is estimated to continue through the end of 2024, to allow for development of these additional indications.

In 2020, the Company entered into Commercial Supply Agreement under the U.S./RoW Agreement with AstraZeneca to define general forecast, order, supply and payment terms for AstraZeneca to purchase roxadustat bulk drug product from FibroGen in support of commercial supplies. The Company shipped bulk drug product to AstraZeneca as pre-commercial supply for process validation purposes during the year ended December 31, 2020 and recognized related drug product revenue of $4.6 million, as described in details under *Drug Product Revenue* section below.

China Agreement

Effective July 30, 2013, the Company (through its subsidiaries affiliated with China) entered into a collaboration agreement with AstraZeneca for the development and commercialization (but not manufacture) of roxadustat for the treatment of anemia in China ("China Agreement"). Under the terms of the China Agreement, AstraZeneca agreed to pay upfront consideration totaling $28.2 million (such amounts were fully received in 2014). Under the China Agreement, the Company is also eligible to receive from AstraZeneca an aggregate of approximately $348.5 million in potential milestone payments, comprised of (i) up to $15.0 million in milestone payments upon achievement of specified clinical and development milestone events, (ii) up to $146.0 million in milestone payments upon achievement of specified regulatory milestone events, and (iii) up to approximately $187.5 million in milestone payments upon the achievement of specified commercial sales and other events. The China Agreement is structured as a 50/50 profit or loss share (as defined), which was amended under the China Amendment discussed below in the third quarter of 2020, and provides for joint development costs (including capital and equipment costs for construction of the manufacturing plant in China), to be shared equally during the development. The aggregate amount of the considerations received under the China Agreement through December 31, 2020 totals $77.2 million.

In December 2019, roxadustat has been included on the updated NRDL released by China's National Healthcare Security Administration for the treatment of anemia in CKD, covering patients who are non-dialysis dependent as well as those who are dialysis-dependent. The inclusion on the NRDL triggered a total of $22.0 million milestones payable to the Company by AstraZeneca. Accordingly, the total consideration of $22.0 million associated with these milestones was included in the transaction price and allocated to performance obligations under the combined arrangement, of which $18.7 million was recognized as revenue during the year ended December 31, 2019. The Company continued to recognize related revenue during the year ended December 31, 2020, from performance obligations satisfied or partially satisfied, and the amount was not material. This milestone payment was received during the first quarter of 2020.

On December 17, 2018, FibroGen Beijing, received marketing authorization from the NMPA for roxadustat, a first-in-class HIF prolyl hydroxylase inhibitor, for the treatment of anemia caused by CKD in patients on dialysis. This approval triggered a $6.0 million milestone payable to the Company by AstraZeneca. On December 29, 2018, FibroGen Beijing received First Manufacturing Approval for a Product in the Field in the Territory, which allows production for Phase 4 clinical studies, patients' early experience programs, donation programs, as well as to supply products for testing and assessments required prior to launch. This approval triggered a $6.0 million milestone payable to the Company by AstraZeneca. Approximately $9.9 million of the total $12.0 million milestone payables was recognized as revenue during the year ended December 31, 2018. The Company continued to recognize related revenues during the years ended December 31, 2019 and 2020, from performance obligations satisfied or partially satisfied, and the amounts were not material.

China Amendment

On July 8, 2020, FibroGen China and AstraZeneca (together with FibroGen China, the "Parties") entered into the China Amendment, effective July 1, 2020, relating to the development and commercialization of roxadustat in China. While the responsibilities of the Parties under the China Agreement remain largely the same, certain changes were made.

Under the China Amendment, in September 2020, FibroGen Beijing and AstraZeneca completed the establishment of a jointly owned entity, Falikang, which will perform roxadustat distribution, as well as conduct sales and marketing through AstraZeneca. See Note 3, *Acquisition and Variable Interest Entity*, for details.

In accordance with the China Amendment, the Company is currently in the interim period. Under the China Amendment, the interim period is defined as the period from April 1, 2020 to the time when Falikang is fully operational, which commenced in January 2021. During the interim period, FibroGen continues to sell product directly to the distributors, who remain as the Company's customers. Under the China Amendment, the calculation for profit or loss share has changed related to sales of roxadustat in China for the period from April 1, 2020 onwards. With effect from April 1, 2020, the Parties have changed the method under which commercial expenses incurred by AstraZeneca are calculated and billed. AstraZeneca's co-promotion expenses for their sales and marketing efforts are now subject to a cap of a percentage of net sales. Once AstraZeneca has been fully reimbursed for their sales and marketing costs under the cap, AstraZeneca will bill the co-promotion expenses based on actual costs on a prospective basis. In addition, the China Amendment has allowed for a higher cost of manufacturing incurred by FibroGen Beijing to be included in the profit or loss share calculation, subject to an annual cap, among other changes.

Once Falikang is fully operational, substantially all direct product sales will be made by Falikang while the Company continues to sell product directly in few provinces in China. AstraZeneca will bill the co-promotion expenses to Falikang and to FibroGen Beijing, respectively, for its services provided to the respective entity. In addition, FibroGen Beijing will sell commercial product to Falikang based on an agreed upon transfer price. Development costs will continue to be shared 50/50 between the Parties.

As a result, the interim period primarily includes the following activities:

- Co-promotion expenses: The China Amendment revised the payment arrangements and calculation of the historical unpaid co-promotion expenses to AstraZeneca for its sales and marketing efforts associated with the commercial sales for roxadustat in China since the product launch. Under the previous China Agreement, payment of these historical co-promotion expenses was subject to certain profitability and cash flow thresholds. No amount of the historical co-promotion costs had been paid prior to the China Amendment as these thresholds had not yet been met. Under the China Amendment, a portion of the historical unpaid co-promotion expenses was adjusted to reduce the amount owed by FibroGen Beijing and the current period co-promotion expenses are capped at a percentage of net roxadustat sales in China. As a result, in the third quarter of 2020, the Company reversed approximately $84.4 million of previously accrued co-promotion expenses payable, which was recorded as a reduction to selling, general and administrative expenses, where these expenses were initially recorded during the periods from the initiation of commercial activities in the first quarter of 2019 to the second quarter of 2020. The co-promotion expenses for the year ended December 31, 2020, capped at a percentage of net roxadustat sales in China, were $27.2 million, included in the selling, general and administrative expenses. After this adjustment, as of December 31, 2020, $16.9 million and $11.5 million of the recalculated accrued co-promotion expenses were recorded in accounts payable and accrued liabilities, respectively, as they were anticipated to be paid within the next 12 months; and $27.4 million of the recalculated accrued co-promotion expenses adjusted under the China Amendment remained in the long-term liabilities, as it is not anticipated to be paid within the next 12 months.
- Profit share: Profit/loss share between FibroGen Beijing and AstraZeneca is based on a calculation of the current period net roxadustat sales in China and deductible expenses pursuant to the China Agreement. Based on the calculation revised under the China Amendment, profit was achieved during the third and fourth quarter of 2020. As a result, the Company recorded a profit share liability of $7.0 million to AstraZeneca as of December 31, 2020 in the accrued and other current liabilities, which correspondingly reduced the deferred revenue related to the performance obligation in accordance with the China Agreement.

Accounting for the Astellas Agreements

For each of the Astellas agreements, the Company has evaluated the promised services within the respective arrangements and has identified performance obligations representing those services and bundles of services that are distinct.

Promised services that were not distinct have been combined with other promised services to form a distinct bundle of promised services, with revenue being recognized on the bundle of services rather than the individual services. There are no right-of-return provisions for the delivered items in the Astellas agreements.

As of December 31, 2020, the transaction price for the Japan Agreement, excluding manufacturing services that is discussed separately below, included $40.1 million of non-contingent upfront payments, $65.0 million of variable consideration related to payments for milestones considered probable of being achieved, and $11.7 million of variable consideration related to co-development billings. The transaction price for the Europe Agreement, excluding manufacturing services that is discussed separately below, included $320.0 million of non-contingent upfront payments, $220.0 million of variable consideration related to payments for milestones considered probable of being achieved, and $225.9 million of variable consideration related to co-development billings.

For revenue recognition purposes, the Company determined that the term of each collaboration agreement with Astellas begins on the effective date and ends upon the completion of all performance obligations contained in the agreement. The contract term is defined as the period in which parties to the contract have present and enforceable rights and obligations. The Company believes that the requirement to continue funding development for a substantive period of time and loss of product rights, along with non-refundable upfront payments already remitted by Astellas, create significant disincentive for Astellas to exercise its right to terminate the agreements.

For the Astellas agreements, the Company allocated the transaction price to the various performance obligations based on the relative SSP of each performance obligation, with the exception of co-development billings allocated entirely to co-development services performance obligations.

For the technology license under the Japan Agreement and the Europe Agreement, SSP was determined primarily by using the discounted cash flow (“DCF”) method, which aggregates the present value of future cash flows to determine the valuation as of the effective date of each of the agreements. The DCF method involves the following key steps: 1) the determination of cash flow forecasts and 2) the selection of a range of comparative risk-adjusted discount rates to apply against the cash flow forecasts. The discount rates selected were based on expectations of the total rate of return, the rate at which capital would be attracted to the Company and the level of risk inherent within the Company. The discounts applied in the DCF analysis ranged from 17.5% to 20.0%. The Company’s cash flow forecasts were derived from probability-adjusted revenue and expense projections by territory. Such projections included consideration of taxes and cash flow adjustments. The probability adjustments were made after considering the likelihood of technical success at various stages of clinical trials and regulatory approval phases. SSP also considered certain future royalty payments associated with commercial performance of the Company’s compounds, transfer prices and expected gross margins.

The promised services that were analyzed, along with their general timing of satisfaction and recognition as revenue, are as follows:

(1) *License to the Company’s technology existing at the effective date of the agreements.* For both of the Astellas agreements, the license was delivered at the beginning of the agreement term. In both cases, the Company concluded at the time of the agreement that its collaboration partner, Astellas, would have the knowledge and capabilities to fully exploit the licenses without the Company’s further involvement. However, the Japan Agreement has contractual limitations that might affect Astellas’ ability to fully exploit the license and therefore, potentially, the conclusion as to whether the license is capable of being distinct. In the Japan Agreement, Astellas does not have the right to manufacture commercial supplies of the drug. In order to determine whether this characteristic of the agreement should lead to a conclusion that the license was not distinct in the context of the agreement, the Company considered the ability of Astellas to benefit from the license together with other resources readily available to Astellas. Finally, the Company considered the fact that at the time of delivery of the license, the development services were beyond the preclinical development phase and any remaining development work in either agreement would not be expected to result in any significant modification or customization to the licensed technology. As such, the development services are separately identifiable from the licensed technology, indicating that the license is a distinct performance obligation.

Manufacturing rights. In the case of the Japan Agreement, the Company retained manufacturing rights largely because of the way the parties chose for FibroGen to be compensated under the agreement. At the time the agreement was signed, the Company believed that it was more advantageous upon commercialization to have a transfer price revenue model in place as opposed to a traditional sales-based model. The manufacturing process does not require specialized knowledge or expertise uniquely held by FibroGen, and notwithstanding contractual restrictions, Astellas could employ manufacturing services from readily available third parties in order to benefit from the license. Therefore, along with the foregoing paragraph, the Company determined that the license in Japan is a distinct performance obligation despite the retention of manufacturing rights by the Company.

In summary, the Company concludes that item (1) represents a performance obligation. The portion of the transaction price allocated to this performance obligation based on a relative SSP basis is recognized as revenue in its entirety at the point in time the license transfers to Astellas.

(2) *Co-development services (Europe Agreement).* This promise relates to co-development services that were reasonably expected to be performed by the Company at the time the collaboration agreement was signed and is considered distinct. Co-development billings are allocated entirely to the co-development services performance obligation as amounts are related specifically to research and development efforts necessary to satisfy the performance obligation, and such an allocation is consistent with the allocation objective. Revenue is recognized over time based on progress toward complete satisfaction of the performance obligation. The Company uses an input method to measure progress toward the satisfaction of the performance obligation, which is based on costs of labor hours and out-of-pocket expenses incurred relative to total expected costs to be incurred. The measure of progress is updated each reporting period. Co-development services are expected to continue over the development period that is currently estimated to continue through the end of 2021. In addition, the Company concluded that the new indication related to CIA approved in January 2019 represents a modification to the Europe agreements at that time and will be accounted for separately, for which the development service period is estimated to continue through the second quarter of 2024. There was no provision for co-development services in the Japan Agreement.

(3) *License to the Company's technology developed during the term of the agreement and development (referred to as "when and if available") and information sharing services.* These promises are generally satisfied throughout the term of the agreements.

(4) *Manufacturing of clinical supplies of products.* This promise is satisfied as supplies for clinical product are delivered for use in the Company's clinical trial programs during the development period, or pre-commercialization period.

(5) *Committee service*. This promise is satisfied throughout the course of the agreements as meetings are attended.

Items (2)-(5) are bundled into a single performance obligation that is distinct given the fact that all are highly interrelated during the development period (pre-commercial phase of development) such that satisfying them independently is not practicable. Revenue is recognized over time based on progress toward complete satisfaction of the performance obligation. The Company uses an input method to measure progress toward the satisfaction of the performance obligation, which is based on costs of labor hours or full time equivalents and out-of-pocket expenses incurred relative to total expected costs to be incurred. The measure of progress is updated each reporting period.

(6) *Manufacturing commercial supplies of products.* This promised service is distinct as services are not interrelated with any of the other performance obligations. Payments received for commercial supplies of products represent sales-based payments related predominately to the license of intellectual property under both Astellas agreements. Revenue is recognized as supplies are shipped for commercial use during the commercialization period.

Under the Japan Amendment the drug product revenue represents variable consideration and is estimated based on the quantity of product shipped, actual listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and possible future changes to the listed price, adjusted for estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk drug product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

Under the Europe Agreement, the drug product revenue amount represents variable consideration and is estimated based on the quantity of product shipped and an estimated price. The estimated price is based on the contractual transfer price percentage applied on the estimated weighted average net sales price per strength, which is estimated to be realized by Astellas from the end sale of roxadustat in its approved territories.

The amount of variable consideration that is included in the transaction price may be constrained, and is included in the drug product revenue only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur in a future period when the uncertainty associated with the variable consideration is subsequently resolved. Estimating variable consideration and the related constraint requires the use of significant management judgment. The Company reviews new information that may affect its variable consideration estimate at every reporting period and records an adjustment to revenue, if certain and material. Actual amounts of consideration ultimately received in the future may differ from the Company's estimates, for which the Company will adjust these estimates and affect the drug product revenue in the period such variances become known.

As each of the agreements provides for annual true up to the considerations paid for its commercial supplies, the Company will re-evaluate the transaction price in each reporting period and record adjustment to revenue as uncertain events are resolved or other changes in circumstances occur.

Accounting for the AstraZeneca Agreements

The Company evaluated whether the U.S./RoW Agreement and the China Agreement should be accounted for as a single or separate arrangements and concluded that the agreements should be accounted for as a single arrangement with the presumption that two or more agreements executed with a single customer at or around the same time should be presumed to be a single arrangement. The key points the Company considered in reaching this conclusion are as follows:

1. While the two agreements were largely negotiated separately, those negotiations proceeded concurrently, and were intended to be completed contemporaneously, presuming AstraZeneca decided to proceed with licenses in all regions available.

2. Throughout negotiations for both agreements, the Company and the counterparties understood and considered the possibility that one arrangement may be executed without the execution of the other arrangement. However, the preference for the Company and the counterparties during the negotiations was to execute both arrangements concurrently.

3. The two agreements were executed as separate agreements because different development, regulatory and commercial approaches required certain terms of the agreements to be structured differently, rather than because the Company or the counterparties considered the agreements to be fundamentally separate negotiations.

Accordingly, as the agreements are being accounted for as a single arrangement, upfront and other non-contingent consideration received and to be received has been and will be pooled together and allocated to each of the performance obligations in both the U.S./RoW Agreement and the China Agreement based on their relative SSPs.

For each of the AstraZeneca agreements, the Company has evaluated the promised services within the respective arrangements and has identified performance obligations representing those services and bundled services that are distinct.

Promised services that were not distinct have been combined with other promised services to form a distinct bundle of promised services, with revenue being recognized on the bundle of services rather than the individual promised services. There are no right-of-return provisions for the delivered items in the AstraZeneca agreements.

As of December 31, 2020, the transaction price for the U.S./RoW Agreement and the China Agreement, excluding manufacturing services that is discussed separately below, included $402.2 million of non-contingent upfront payments, $114.0 million of variable consideration related to payments for milestones considered probable of being achieved, $564.9 million of variable consideration related to co-development billings, offset by $7.0 million of variable consideration related to profit share under the China Amendment.

For the AstraZeneca agreements, the Company allocated the transaction price to the various performance obligations based on the relative SSP of each performance obligation, with the exception of co-development billings and commercial sale of product. Co-development billings under the U.S./RoW Agreement were allocated entirely to the U.S./RoW co-development services performance obligation, and co-development billings under the China Agreement were allocated entirely to the combined performance obligation under the China Agreement. Commercial sale of product under the U.S./ROW Agreement is entirely allocated to the manufacturing commercial supply of products performance obligation, and commercial sale of product under the China Agreement is allocated entirely to the combined China performance obligation.

For revenue recognition purposes, the Company determined that the term of its collaboration agreements with AstraZeneca begin on the effective date and ends upon the completion of all performance obligations contained in the agreements. The contract term is defined as the period in which parties to the contract have present and enforceable rights and obligations. The Company believes that the requirement to continue funding development for a substantive period of time and the loss of product rights, along with non-refundable upfront payments already remitted by AstraZeneca, represent substantive termination penalties that create significant disincentive for AstraZeneca to exercise its right to terminate the agreement.

For the technology license under the AstraZeneca U.S./RoW Agreement, SSP was determined based on a two-step process. The first step involved determining an implied royalty rate that would result in the net present value of future cash flows to equal to zero (i.e. where the implied royalty rate on the transaction would equal the target return for the investment). This results in an upper bound estimation of the magnitude of royalties that a hypothetical acquirer would reasonably pay for the forecasted cash flow stream. The Company's cash flow forecasts were derived from probability-adjusted revenue and expense projections. Such projections included consideration of taxes and cash flow adjustments. The probability adjustments were made after considering the likelihood of technical success at various stages of clinical trials and regulatory approval phases. The second step involved applying the implied royalty rate, which was determined to be 40%, against the probability-adjusted projected net revenues by territory and determining the value of the license as the net present value of future cash flows after adjusting for taxes. The discount rate utilized was 17.5%.

U.S./RoW Agreement:

The promised services that were analyzed, along with their general timing of satisfaction and recognition as revenue, are as follows:

(1) *License to the Company's technology existing at the effective date of the agreements.* For the U.S./RoW Agreement, the license was delivered at the beginning of the agreement term. The Company concluded that AstraZeneca has the knowledge and capabilities to fully exploit the license under the U.S./RoW Agreement without the Company's further involvement. Finally, the Company considered the fact that at the time of delivery of the license, the development services were beyond the preclinical development phase and any remaining development work would not be expected to result in any significant modification or customization to the licensed technology. As such, the development services are separately identifiable from the licensed technology, indicating that the license is a distinct performance obligation. Therefore, the Company has concluded that the license is distinct and represents a performance obligation. The portion of the transaction price allocated to this performance obligation based on a relative SSP basis is recognized as revenue in its entirety at the point in time the license transfers to AstraZeneca.

(2) *Co-development services.* This promise relates to co-development services that were reasonably expected to be performed by the Company at the time the collaboration agreement was signed and is distinct. Co-development billings are allocated entirely to the co-development services performance obligation as amounts are related specifically to research and development efforts necessary to satisfy the performance obligation, and such an allocation is consistent with the allocation objective. Revenue is recognized over time based on progress toward complete satisfaction of the performance obligation. The Company uses an input method to measure progress toward the satisfaction of the performance obligation, which is based on costs of labor hours or full time equivalents and out-of-pocket expenses incurred relative to total expected costs to be incurred. Co-development services are expected to continue over the development period that is currently estimated to continue through the end of the first quarter of 2021. In addition, the Company concluded that the addition of the new indications related to CIA, anemia of chronic inflammation and multiple myeloma approved during the fourth quarter of 2018 represents a modification to the collaboration agreements and will be accounted for separately, for which the joint development service period is estimated to continue through the end of 2024.

(3) *Manufacturing of clinical supplies of products.* This promise is satisfied as supplies for clinical product are delivered for use in the Company's clinical trial programs during the development period, or pre-commercialization period.

(4) *Information sharing and committee service.* These promises are satisfied throughout the course of the agreement as services are provided.

Items (2)-(4) are bundled into a single performance obligation that is distinct given the fact that all are highly interrelated during the development period (pre-commercial phase of development) such that delivering them independently is not practicable. Revenue is recognized over time based on progress toward complete satisfaction of the performance obligation. The Company uses an input method to measure progress toward the satisfaction of the performance obligation, which is based on costs of labor hours or full time equivalents and out-of-pocket expenses incurred relative to total expected costs to be incurred. The measure of progress is updated each reporting period.

(5) *Manufacturing commercial supplies of products.* This promise is distinct as services are not interrelated with any of the other performance obligations. Revenue is recognized as supplies are shipped for commercial use during the commercialization period. The drug product revenue amount represents variable consideration and is estimated based on the quantity of product shipped and an estimated price for each individual purchase order. The estimated price is based on the contractual transfer price percentage applied on the estimated weighted average net sales price, which is estimated to be realized by AstraZeneca from the end sale of roxadustat in its approved territories.

The amount of variable consideration that is included in the transaction price may be constrained, and is included in the drug product revenue only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur in a future period when the uncertainty associated with the variable consideration is subsequently resolved. Estimating variable consideration and the related constraint requires the use of significant management judgment. The Company reviews new information that may affect its variable consideration estimate at every reporting period and records an adjustment to revenue, if certain and material. Actual amounts of consideration ultimately received in the future may differ from the Company's estimates, for which the Company will adjust these estimates and affect the drug product revenue in the period such variances become known.

As the agreement provides for an annual true up to the considerations paid for its commercial supplies, the Company will re-evaluate the transaction price in each reporting period and record an adjustment to revenue as uncertain events are resolved or other changes in circumstances occur.

China Agreement:

The promised services that were analyzed are consistent with the U.S./RoW Agreement, except for license to the Company's technology existing at the effective date of the agreement, described as follows:

- *License to the Company's technology existing at the effective date of the agreement.* The license was delivered at the beginning of the agreement term. However, the China Agreement with AstraZeneca has contractual limitations that might affect AstraZeneca's ability to fully exploit the license and therefore, potentially, the conclusion as to whether the license is distinct in the context of the agreement. In the China Agreement, AstraZeneca does not have the right to manufacture commercial supplies of the drug. In order to determine whether this characteristic of the arrangement should lead to a conclusion that the license was not distinct in the context of the agreement, the Company considered the ability of AstraZeneca to benefit from the license on its own or together with other resources readily available to AstraZeneca.

For the China Agreement, the Company retained manufacturing rights as an essential part of a strategy to pursue domestic regulatory pathway for product approval which requires the regulatory licensure of the manufacturing facility in order to commence commercial shipment. The prospects for the collaboration as a whole would have been substantially different had manufacturing rights been provided to AstraZeneca. We hold the rights to manufacture commercial drug product in China. Therefore, AstraZeneca cannot benefit from the license on its own or together with other readily available resources. Accordingly, all the promises identified, including the license, co-development services and manufacturing of commercial supplies,, under the China Agreement have been bundled into a single performance obligation and amounts of the transaction price allocable to this performance obligation are deferred until control of the manufactured commercial drug product has begun to transfer to AstraZeneca.

In accordance with the China Amendment, once Falikang is fully operational, which commenced in January 2021, substantially all product sales will be made by Falikang directly to the distributors in China, while the Company continues to sell directly in few provinces in China. Revenue will be recognized upon the transfer of control of commercial drug product to Falikang. For the Company's direct sales of commercial drug product, revenue will be recognized when control of the promised good is transferred to the customer in an amount that reflects the consideration to which the Company expects to be entitled to in exchange for the product.

Summary of revenue recognized under the collaboration agreements

The table below summarizes the accounting treatment for the various performance obligations pursuant to each of the Astellas and AstraZeneca agreements. License amounts identified below are included in the "License revenue" line item in the consolidated statements of operations. All other elements identified

below are included in the "Development and other revenue" line item in the consolidated statements of operations.

Amounts recognized as license revenue and development revenue under the Japan Agreement with Astellas were as follows (in thousands):

		Years Ended December 31,		
Agreement	Performance Obligation	2020	2019	2018
Japan	License revenue	$ 14,323	$ 11,935	$ 14,323
	Development revenue	$ 1,220	$ 1,222	$ 2,400

The transaction price related to consideration received and accounts receivable has been allocated to each of the following performance obligations under the Japan Agreement, along with any associated deferred revenue as follows (in thousands):

Japan Agreement	Cumulative Revenue Through December 31, 2020	Deferred Revenue at December 31, 2020	Total Consideration Through December 31, 2020
License	$ 100,347	$ —	$ 100,347
Development revenue	16,350	130	16,480
Total license and development revenue	$ 116,697	$ 130	$ 116,827

The revenue recognized under the Japan Agreement for the year ended December 31, 2020 included an increase of $15.1 million resulting from changes to estimated variable consideration in the current year relating to performance obligations satisfied or partially satisfied in previous periods. The Company does not expect material variable consideration from estimated future co-development billing beyond development period in the transaction price related to the Japan Agreement.

Amounts recognized as license revenue and development revenue under the Europe Agreement with Astellas were as follows (in thousands):

		Years Ended December 31,		
Agreement	Performance Obligation	2020	2019	2018
Europe	License revenue	$ —	$ 117,470	$ —
	Development revenue	$ 17,954	$ 28,172	$ 18,503

The transaction price related to consideration received and accounts receivable has been allocated to each of the following performance obligations under the Europe Agreement with Astellas, along with any associated deferred revenue as follows (in thousands):

Europe Agreement	Cumulative Revenue Through December 31, 2020	Deferred Revenue at December 31, 2020	Total Consideration Through December 31, 2020
License	$ 487,951	$ —	$ 487,951
Development revenue	248,962	1,429	250,391
Total license and development revenue	$ 736,913	$ 1,429	$ 738,342

The revenue recognized under the Europe Agreement for the year ended December 31, 2020 included an increase in revenue of $1.5 million resulting from changes to estimated variable consideration in the current year relating to performance obligations satisfied or partially satisfied in previous periods. The remainder of the transaction price related to the Europe Agreement includes $27.6 million of variable consideration from estimated future co-development billing and is expected to be recognized over the remaining development service period.

Amounts recognized as license revenue and development revenue under the U.S./RoW and China Agreements with AstraZeneca were as follows (in thousands):

Agreement	Performance Obligation	Years Ended December 31, 2020	2019	2018
U.S. / RoW and China	License revenue	$ —	$ 47,681	$ 7,946
	Development revenue	61,508	84,629	104,970
	China performance obligation	$ (90)	$ 90	$ —

The transaction price related to consideration received and accounts receivable has been allocated to each of the following performance obligations under the U.S./RoW Agreement and China Agreement, along with any associated deferred revenue as follows (in thousands):

U.S. / RoW and China Agreements	Cumulative Revenue Through December 31, 2020	Deferred Revenue at December 31, 2020	Total Consideration Through December 31, 2020
License	$ 341,844	$ —	$ 341,844
Co-development, information sharing & committee services	554,775	2,276	557,051
China performance obligation	—	137,338	137,338
Total license and development revenue	$ 896,619	$ 139,614 *	$ 1,036,233

* Contract assets and liabilities related to rights and obligations in the same contract are recorded net on the consolidated balance sheets. As of December 31, 2020, deferred revenue included $137.5 million related to the U.S./RoW and China Agreement, which represents the net of $139.6 million of deferred revenue presented above and a $2.1 million unbilled co-development revenue under the China Amendment with AstraZeneca.

The revenue recognized under the U.S./RoW Agreement and China Agreement for the year ended December 31, 2020 included a reduction in revenue of $2.9 million resulting from changes to estimated variable consideration in the current year relating to performance obligations satisfied or partially satisfied in previous periods. The remainder of the transaction price related to the U.S./RoW Agreement and China Agreement includes $37.9 million of variable consideration from estimated future co-development billing. The amount allocated to the U.S./RoW Agreement is expected to be recognized over the remaining development service period. The amount allocated to the China performance obligation is expected to be recognized as the Company transfers control of the commercial drug product to Falikang.

Product Revenue, Net

Product revenue from roxadustat commercial sales in China is recognized in an amount that reflects the consideration to which the Company expects to be entitled in exchange for those products, net of various sales rebates and discounts. Product revenue, net was as follows (in thousands):

	Years Ended December 31, 2020	2019
Gross revenue	$ 89,027	$ 2,803
Price adjustment	—	(936)
Non-key account hospital listing award	(9,325)	—
Contractual sales rebate	(6,189)	(149)
Other discounts and rebates	(923)	(18)
Sales return	(92)	—
Product revenue, net	$ 72,498	$ 1,700

In the second quarter of 2020, the Company amended the agreement with its pharmaceutical distributors, which triggered accounting modifications particularly related to the non-key account hospital listing award. For the year ended December 31, 2020, the non-key account hospital listing award was $9.3 million, which was recorded as a reduction to the revenue and calculated based on eligible non-key account hospital listings to date achieved by each distributor with certain requirements met during the period.

For the year ended December 31, 2020 and 2019, the contractual sales rebate was $6.2 million and $0.1 million, respectively, which were calculated based on the stated percentage of gross sales by each distributor in the distribution agreement entered between FibroGen and each distributor. All other rebates and discounts, including sales return allowance were immaterial for the periods presented.

For the year ended December 31, 2019, a $0.9 million of price adjustment was recorded based on government-listed price guidance and estimated channel inventory levels.

The rebates and discounts that the Company's pharmaceutical distributors have earned are eligible to be applied against future sales orders, limited to certain maximums until such rebates and discounts are exhausted. These rebates and discounts are recorded as contract liabilities at the time they become eligible in the same period that the related revenue is recorded. Due to the distributor's legal right to offset, at each balance sheet date, the rebates and discounts are presented as reductions to gross accounts receivable from the distributor, or as a current liability to the distributor to the extent that the total amount exceeds the gross accounts receivable or when the Company expects to settle the discount in cash. The distributor's legal right of offset is calculated at the individual distributor level. The following table includes a roll-forward of the related contract liabilities (in thousands):

	Balance at December 31, 2019	Additions	Deduction	Currency Translation and Other	Gross Contract Liabilities Balance	Balance Presented Net Against Accounts Receivable	Balance at December 31, 2020
Product revenue - Contract liabilities	$ (1,102)	$ (16,497)	$ 2,184	$ (270)	$ (15,685)	$ 548	$ (15,137)

As of December 31, 2020, the total rebates and discounts as reductions to gross accounts receivable was $0.5 million, and the total contract liabilities was $15.1 million, which was included in accrued and other current liabilities in the consolidated balance sheet.

The reductions to gross accounts receivable, including the above-mentioned contra-accounts receivable items related to product revenue, totaled $0.8 million and $1.1 million as of December 31, 2020 and 2019, respectively.

Drug Product Revenue

Drug product revenue was as follows (in thousands):

	Years Ended December 31,		
	2020	2019	2018
Astellas	$ 4,281	$ (36,324)	$ 64,776
AstraZeneca	4,625	—	—
Drug product revenue	$ 8,906	$ (36,324)	$ 64,776

The Company fulfilled all the shipment obligations under the term of the Japan Amendment during the year ended December 31, 2018, and recognized the related product revenue of $64.8 million in the same period based on a transaction price that was subject to potential future adjustments, which represented a form of variable consideration.

A change in estimated variable consideration incurred in 2019 related to the above API shipments in 2018, at the time the actual listed price for roxadustat was issued by the Japanese Ministry of Health, Labour and Welfare, which resulted in a total difference of $36.3 million between the estimated and the actual listed price and yield from the manufacture of bulk product tablets.

In addition, during the year ended December 31, 2020, the Company recorded another $4.0 million reduction to drug product revenue related to the above API shipments, due to a change in estimated variable consideration. Specifically, the change in estimated variable consideration was based on the API held by Astellas at March 31, 2020 adjusted to reflect the updated listed price for roxadustat issued by the Japanese Ministry of Health, Labour and Welfare and changes in the estimated bulk product strength mix intended to be manufactured by Astellas, estimated cost to convert the API to bulk product tablets, and estimated yield from the manufacture of bulk product tablets, among others.

During the second quarter of 2020, the Company fulfilled shipment obligations under the term of Japan Amendment with Astellas, and recognized related drug product revenue of $8.2 million in the same period.

During the fourth quarter of 2020, the Company shipped bulk drug product from process validation supplies for commercial purposes under the term of the Europe Agreement with Astellas. The Company constrained the consideration from this shipment due to a high degree of uncertainty associated to the final consideration. As a result, the Company recorded $1.4 million as current deferred revenue and $4.6 million as long-term deferred revenue as of December 31, 2020. The deferred revenue will be recognized as and when uncertainty is resolved. The following table includes a roll-forward of the related contract liabilities (in thousands):

	Balance at December 31, 2019	Additions	Balance at December 31, 2020
Drug product revenue - Astellas - contract liabilities	$ —	$ (5,984)	$ (5,984)

During the year ended December 31, 2020, the Company shipped bulk drug product to AstraZeneca as pre-commercial supply for process validation purposes, under the term of Commercial Supply Agreement under the U.S./RoW Agreement with AstraZeneca, and recognized drug product revenue of $4.6 million.

Other Revenues

Other revenues consist primarily of collagen material sold for research purposes. Other revenues were immaterial for each of the three years ended December 31, 2020.

Deferred Revenue

Deferred revenue represents amounts billed, or in certain cases, yet to be billed to the Company’s collaboration partners for which the related revenues have not been recognized because one or more of the revenue recognition criteria have not been met. The current portion of deferred revenue represents the amount to be recognized within one year from the balance sheet date based on the estimated performance period of the underlying performance obligations. The long-term portion of deferred revenue represents amounts to be recognized after one year through the end of the non-contingent performance period of the underlying performance obligations.

Deferred revenue includes amounts allocated to the China performance obligation under the AstraZeneca arrangement as revenue recognition associated with this unit of accounting is tied to the commercial launch of the products within China and to when the control of the manufactured commercial drug product is transferred to AstraZeneca. As of December 31, 2020, approximately $3.5 million of the deferred revenue related to the China unit of accounting was included in short-term deferred revenue, which represents the amount of deferred revenue associated with the China unit of accounting that is expected to be recognized within the next 12 months, associated with the commercial sales in China.

5. Fair Value Measurements

In accordance with the authoritative guidance on fair value measurements and disclosures under U.S. GAAP, the Company presents all financial assets and liabilities and any other assets and liabilities that are recognized or disclosed at fair value on a nonrecurring basis. The guidance defines fair value, establishes a framework for measuring fair value in generally accepted accounting principles and expands disclosures about fair-value measurements. The guidance also requires fair value measurements be classified and disclosed in one of the following three categories:

Level 1: Quoted prices in active markets for identical assets or liabilities.

Level 2: Observable inputs other than quoted prices in active markets for identical assets or liabilities.

Level 3: Unobservable inputs.

The Company values certain assets and liabilities, focusing on the inputs used to measure fair value, particularly in instances where the measurement uses significant unobservable (Level 3) inputs. The Company's financial instruments are valued using quoted prices in active markets (Level 1) or based upon other observable inputs (Level 2). The Company's assessment of the significance of a particular input to the fair value measurement in its entirety requires management to make judgments and considers factors specific to the asset or liability. In addition, the categories presented do not suggest how prices may be affected by the size of the purchases or sales, particularly with the largest highly liquid financial issuers who are in markets continuously with non-equity instruments, or how any such financial assets may be impacted by other factors such as U.S. government guarantees. Assets and liabilities measured at fair value are classified in their entirety based on the lowest level of input that is significant to the fair value measurement. The availability of observable data is monitored to assess appropriate classification of financial instruments within the fair value hierarchy. Depending upon the availability of such inputs, specific securities may transfer between levels. In such instances, the transfer is reported at the end of the reporting period.

The fair values of the Company's financial assets that are measured on a recurring basis are as follows (in thousands):

	December 31, 2020			
	Level 1	Level 2	Level 3	Total
Bond and mutual funds	$ —	$ 8,144	$ —	$ 8,144
Equity investments	244	—	—	244
Money market funds	590,347	—	—	590,347
Total	$ 590,591	$ 8,144	$ —	$ 598,735

	December 31, 2019			
	Level 1	Level 2	Level 3	Total
U.S. treasury notes and bills	$ 347,383	$ 80,123	$ —	$ 427,506
Bond and mutual funds	10,816	—	—	10,816
Equity investments	255	—	—	255
Money market funds	85,551	—	—	85,551
Certificate of deposit	—	30,032	—	30,032
Total	$ 444,005	$ 110,155	$ —	$ 554,160

The Company's Level 2 investments are valued using third-party pricing sources. The pricing services utilize industry standard valuation models, including both income and market-based approaches, for which all significant inputs are observable, either directly or indirectly, to estimate fair value. These inputs include reported trades of and broker/dealer quotes on the same or similar investments, issuer credit spreads, benchmark investments, prepayment/default projections based on historical data and other observable inputs. There were no transfers of assets between levels for the years ended December 31, 2020 and 2018. During the fourth quarter of 2019, there was a $29.8 million transfer of assets from Level 1 to Level 2 as such US treasury notes and bills were changed to off-the-run when they were issued before the most recent issue and were still outstanding at measurement day.

The fair values of the Company's financial liabilities that are carried at historical cost are as follows (in thousands):

	December 31, 2020			
	Level 1	Level 2	Level 3	Total
Lease obligations	$ —	$ —	$ 1,141	$ 1,141

	December 31, 2019			
	Level 1	Level 2	Level 3	Total
Lease obligations	$ —	$ —	$ 1,544	$ 1,544

The fair value of the Company's financial liabilities were derived by using an income approach, which required Level 3 inputs such as discounted estimated future cash flows.

There were no transfers of liabilities between levels for the years ended December 31, 2020, 2019 and 2018.

6. Leases

The Company currently has two building leases treated as finance leases.

In 2006, the Company entered into a long-term property lease with Alexandria for its corporate headquarters in San Francisco, California, with an initial term of 15 years, scheduled to expire in 2023. The Company has an option to extend the lease for an additional 10 years through 2033. The lease contract provides for a fixed annual rent, with scheduled increases of two percent that occur on each anniversary of the rent commencement date. This lease requires the Company to pay all costs of ownership, operation, and maintenance of the premises, including without limitation all operating costs, insurance costs, and taxes.

In 2013, the Company entered into a long-term property lease with Beijing Economic-Technological Development Area ("BDA") Management Committee for a pilot plant located in Beijing Yizhuang Biomedical Park of BDA. The building is leased for an initial lease term of eight years, scheduled to expire in 2021. Renewal options are not specified within the lease contract. The lease contract provides for fixed quarterly rent payments, with scheduled increases that occur as detailed in the lease contract. This lease requires the Company to pay all operating and maintenance costs, and a fixed amount for property management fees.

The Company currently has six additional real estate leases for office spaces in Shanghai and Beijing, China, which are treated as operating leases. These leases have lease terms ranging from two to three years, expiring in 2023. These lease contracts provide for fixed quarterly rent payments, and require the Company to pay operating and maintenance costs, and a fixed amount for property management fees.

In addition, the Company has several immaterial lease arrangements in China and U.S. for office equipment, scientific devices and automobile leases, with contracted lease terms ranging from two to four years, treated as finance leases or operating leases, respectively.

The Company's lease assets and related lease liabilities were as follows (in thousands):

	Balance Sheet Line Item	December 31, 2020	December 31, 2019
Assets			
Finance:			
Right-of-use assets - cost		$ 50,477	$ 49,909
Accumulated amortization		(20,871)	(10,307)
Finance lease right-of-use assets, net	Finance lease right-of-use assets	29,606	39,602
Operating:			
Right-of-use assets - cost		3,934	2,736
Accumulated amortization		(1,891)	(805)
Operating lease right-of-use assets, net	Other assets	2,043	1,931
Total lease assets		$ 31,649	$ 41,533
Liabilities			
Current:			
Finance lease liabilities	Finance lease liabilities, current	$ 12,330	$ 12,351
Operating lease liabilities	Accrued and other current liabilities	1,188	983
Non-current:			
Finance lease liabilities	Finance lease liabilities, non-current	25,391	37,610
Operating lease liabilities	Other long-term liabilities	853	942
Total lease liabilities		$ 39,762	$ 51,886

The components of lease expense were as follows (in thousands):

	Statement of Operations Line Item	Years Ended December 31, 2020	2019
Finance lease cost:			
Amortization of right-of-use assets	Cost of goods sold; Research and development; Selling, general and administrative expenses	$ 10,369	$ 10,307
Interest on lease liabilities	Interest expense	1,932	2,373
Operating lease cost	Cost of goods sold; Research and development; Selling, general and administrative expenses	1,151	891
Sublease income	Selling, general and administrative expenses	(1,201)	(1,385)
Total lease cost		$ 12,251	$ 12,186

Supplemental cash flow information related to leases were as follows (in thousands):

	Years Ended December 31, 2020	2019
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	$ 951	$ 914
Operating cash flows from finance leases	1,896	2,196
Financing cash flows from finance leases	12,620	11,925
Right-of-use assets obtained in exchange for new lease liabilities:		
Finance leases	662	49,909
Operating leases	$ 1,072	$ 2,736

Lease term and discount rate were as follows:

	December 31, 2020	2019
Weighted-average remaining lease term (years):		
Finance leases	2.9	3.6
Operating leases	1.8	2.1
Weighted-average discount rate:		
Finance leases	4.39%	4.42%
Operating leases	4.74%	4.75%

Maturities of lease liabilities as of December 31, 2020 are as follows (in thousands):

Year Ending December 31,	Finance Leases	Operating Leases
2021	$ 13,689	$ 1,142
2022	13,886	839
2023	12,526	143
Total future lease payments	40,101	2,124
Less: Interest	(2,380)	(83)
Present value of lease liabilities	$ 37,721	$ 2,041

7. Balance Sheet Components

Cash and Cash Equivalents

Cash and cash equivalents consisted of the following (in thousands):

	December 31,	
	2020	2019
Cash	$ 88,046	$ 40,715
Money market funds	590,347	85,551
Total cash and cash equivalents	$ 678,393	$ 126,266

Investments

The Company's investments consist of available-for-sale debt investments, marketable equity investments, term deposit and certificate of deposit. The amortized cost, gross unrealized holding gains or losses, and fair value of the Company's investments by major investments type are summarized in the tables below (in thousands):

	December 31, 2020			
	Amortized Cost	Gross Unrealized Holding Gains	Gross Unrealized Holding Losses	Fair Value
Bond and mutual funds	$ 8,147	$ —	$ (3)	$ 8,144
Equity investments	125	119	—	244
Total investments	$ 8,272	$ 119	$ (3)	$ 8,388

	December 31, 2019			
	Amortized Cost	Gross Unrealized Holding Gains	Gross Unrealized Holding Losses	Fair Value
U.S. treasury notes and bills	$ 426,995	$ 536	$ (25)	$ 427,506
Certificates of deposit	30,000	32	—	30,032
Bond and mutual funds	10,730	86	—	10,816
Equity investments	125	130	—	255
Total investments	$ 467,850	$ 784	$ (25)	$ 468,609

The contractual maturities of the available-for-sale investments were as follows (in thousands):

	December 31, 2020
Within one year - Bond and mutual funds	$ 8,144
Equity investments	244
Total investments	$ 8,388

The Company periodically reviews its available-for-sale investments and term deposit for other-than-temporary impairment. The Company considers factors such as the duration, severity and the reason for the decline in value, the potential recovery period and its intent to sell. For debt securities, the Company also considers whether (i) it is more likely than not that the Company will be required to sell the debt securities before recovery of their amortized cost basis, and (ii) the amortized cost basis cannot be recovered as a result of credit losses. During the three years ended December 31, 2020, the Company did not recognize any other-than-temporary impairment loss.

Inventories

Inventories consisted of the following (in thousands):

	December 31,	
	2020	2019
Raw materials	$ 2,303	$ 325
Work-in-progress	8,114	2,264
Finished goods	6,113	4,298
Total inventories	$ 16,530	$ 6,887

The Company started capitalizing inventory costs in June 2019 when FibroGen Beijing began productions of roxadustat for commercial sales purposes. The Company started capitalizing pre-launch inventory costs in the U.S. the second quarter of 2020 prior to regulatory approval. As of December 31, 2020, pre-launch inventory capitalized was 29% of the total inventory balance. The provision to write-down excess and obsolete inventory was nominal for the years ended December 31, 2020 and 2019.

Prepaid expenses and other current assets

Prepaid expenses and other current assets consisted of the following (in thousands):

	December 31,	
	2020	2019
Unbilled contract assets	$ 2,147	$ 180,000
Deferred revenues from associated contracts	(2,147)	(54,790)
Net unbilled contract assets	—	125,210
Prepaid assets	8,353	6,464
Other current assets	1,807	1,717
Total prepaid expenses and other current assets	$ 10,160	$ 133,391

The unbilled contract assets as of December 31, 2020 were related to unbilled co-development revenue under the China Amendment with AstraZeneca. The unbilled contract assets as of December 31, 2019 were related to two regulatory milestones totaling $130.0 million under the Europe Agreement with Astellas associated with the planned MAA submission in Europe, and a $50.0 million regulatory milestone under the U.S./RoW Agreement with AstraZeneca associated with the NDA submission in the U.S., which was submitted in December 2019 and accepted for review in February 2020. See Note 4, *Collaboration Agreements and Revenues*, for details.

Property and Equipment

Property and equipment consisted of the following (in thousands):

	December 31,	
	2020	2019
Leasehold improvements	$ 102,006	$ 101,548
Laboratory equipment	18,143	17,329
Machinery	8,312	8,217
Computer equipment	9,545	8,399
Furniture and fixtures	6,128	5,822
Construction in progress	760	1,792
Total property and equipment	$ 144,894	$ 143,107
Less: accumulated depreciation	(111,247)	(100,364)
Property and equipment, net	$ 33,647	$ 42,743

Depreciation expense for the years ended December 31, 2020, 2019 and 2018 was $11.7 million, $11.1 million, and $6.6 million, respectively.

Accrued and Other Current Liabilities

Accrued and other current liabilities consisted of the following (in thousands):

	December 31,	
	2020	2019
Preclinical and clinical trial accruals	$ 44,113	$ 16,279
API product price adjustment	—	36,324
Payroll and related accruals	22,800	19,784
Contract liabilities to pharmaceutical distributors	15,137	—
Accrued co-promotion expenses - current	11,537	—
Roxadustat profit share to AstraZeneca	7,007	—
Property taxes and other	5,970	2,044
Professional services	4,869	4,842
Other	8,088	4,543
Total accrued and other current liabilities	$ 119,521	$ 83,816

The API product price adjustment of $36.3 million accrued as of December 31, 2019 was related to the change in estimated variable consideration of API product at the time the roxadustat listed price was issued by the Japanese Ministry of Health, Labour and Welfare in the fourth quarter of 2019. This amount was fully paid during the first quarter of 2020. Refer to Note 4, *Collaboration Agreements and Revenues*, for details.

On July 8, 2020, the Parties entered into an amendment to the China Agreement, relating to the development and commercialization of roxadustat in China, which revised, among other things, the arrangements and calculation of the estimated co-promotion expenses payable to AstraZeneca for its sales and marketing efforts associated with the commercial sales for roxadustat in China. As a result, the previously accrued long-term co-promotion expenses were significantly reduced during the third quarter of 2020. $11.5 million of the recalculated accrued co-promotion expenses is anticipated to be paid within the next 12 months, therefore was recorded as a current liability as of December 31, 2020.

The profit share liability of $7.0 million to AstraZeneca as of December 31, 2020 represented the profit/loss share between FibroGen Beijing and AstraZeneca that is calculated pursuant to the China Agreement. This liability correspondingly reduced the deferred revenue related to the performance obligation in accordance with the China Agreement. Refer to Note 4, *Collaboration Agreements and Revenues*, for details.

Other Long-term Liabilities

Other long-term liabilities consisted of the following (in thousands):

	December 31,	
	2020	2019
Accrued long-term co-promotion expenses	$ 27,424	$ 53,071
Other long-term tax liabilities	8,675	8,913
Operating lease liabilities, non-current	853	942
Other	2,690	2,481
Total other long-term liabilities	$ 39,642	$ 65,407

The accrued long-term co-promotional expenses of $53.1 million as of December 31, 2019 was related to the estimated amount payable to AstraZeneca for its sales and marketing efforts related to the commercial launch for roxadustat in China. As mentioned above, the China Amendment revised the arrangements and calculation of the estimated co-promotion expenses payable to AstraZeneca. As a result, we reversed approximately $84.4 million of previously accrued long-term co-promotion expenses during the third quarter of 2020. $27.4 million of the recalculated accrued co-promotion expenses remained in the long-term liabilities as of December 31, 2020, as it is not anticipated to be paid within the next 12 months.

8. Product Development Obligations

The Technology Development Center of the Republic of Finland ("TEKES") product development obligations consist of 11 separate advances (each in the form of a note agreement) received by FibroGen Europe between 1996 and 2008 from TEKES. These advances are granted on a project-by-project basis to fund various product development efforts undertaken by FibroGen Europe only. Each separate note is denominated in EUR and bears interest (not compounded) calculated as one percentage point less than the Bank of Finland rate in effect at the time of the note, but no less than 3.0%.

If the research work funded by TEKES does not result in an economically profitable business or does not meet its technological objectives, TEKES may, on application from FibroGen Europe, forgive each of these loans, including accrued interest, either in full or in part. As of December 31, 2020 and 2019, the Company had U.S. Dollar equivalent of $11.6 million and $10.6 million of principal outstanding, respectively, and $7.1 million and $6.2 million of interest accrued, respectively, which were presented in the product development obligations line on the consolidated balance sheets.

The Company is not a guarantor of these loans, and these loans are not repayable by FibroGen Europe until it has distributable funds.

9. Commitments and Contingencies

Contract Obligations

As of December 31, 2020, the Company had outstanding total non-cancelable purchase obligations of $86.0 million. The Company expects to fulfill our commitments under these agreements in the normal course of business, and as such, no liability has been recorded. The unconditional purchase obligations consisted of the following (in thousands):

	Purchase Obligations Due In The Year Ending December 31,		
	2021	2022	Total
	(in thousands)		
Manufacture and supply of roxadustat	$ 14,114	$ 10,951	$ 25,065
Manufacture and supply of pamrevlumab	24,480	33,063	57,543
Other purchases	3,418	—	3,418
Total purchase obligations	$ 42,012	$ 44,014	$ 86,026

Some of the Company's license agreements provide for periodic maintenance fees over specified time periods, as well as payments by the Company upon the achievement of development, regulatory and commercial milestones. Future milestone payments for research and pre-clinical stage development programs consisted of up to approximately $10.9 million in total potential future milestone payments under the Company's license agreements with Dana-Farber Cancer Institute, University of Miami and Medarex, Inc. These milestone payments generally become due and payable only upon the achievement of certain developmental, clinical, regulatory and/or commercial milestones. The event triggering such payment or obligation has not yet occurred.

Legal Proceedings

From time to time, the Company is a party to various legal actions, both inside and outside the U.S., arising in the ordinary course of its business or otherwise. The Company accrues amounts, to the extent they can be reasonably estimated, that the Company believes will result in a probable loss (including, among other things, probable settlement value), to adequately address any liabilities related to legal proceedings and other loss contingencies. A loss or a range of loss is disclosed when it is reasonably possible that a material loss will incur and can be estimated, or when it is reasonably possible that the amount of a loss, when material, will exceed the recorded provision.

On April 20, 2020, in response to an invalidation action brought against certain FibroGen United Kingdom patents by Akebia, the United Kingdom court handed down a decision invalidating United Kingdom designations of European Patent Nos. 1463823, 1633333, 2298301, 2322153, and 2322155. The United Kingdom designation to European Patent No. 2289531 was held to be valid in amended form, but not infringed by Akebia. The Company and its partner Astellas have filed an appeal of the decision in the United Kingdom Court of Appeal. The Company did not have material accruals for any currently active legal action in its consolidated balance sheets as of December 31, 2020, as it could not predict the ultimate outcome of these matters, or reasonably estimate the potential exposure.

Indemnification Agreements

The Company enters into standard indemnification arrangements in the ordinary course of business, including for example, service, manufacturing and collaboration agreements. Pursuant to these arrangements, the Company indemnifies, holds harmless, and agrees to reimburse the indemnified parties for losses suffered or incurred by the indemnified party, including in connection with intellectual property infringement claims by any third party with respect to its technology. The term of these indemnification agreements is generally perpetual any time after the execution of the agreement. The Company has entered into indemnification agreements with its directors and officers that may require the Company to indemnify its directors and officers against liabilities that may arise by reason of their status or service as directors or officers to the extent permissible under applicable law. The maximum potential amount of future payments the Company could be required to make under these arrangements is not determinable. The Company has never incurred costs to defend lawsuits or settle claims related to these indemnification agreements. As a result, the Company believes the estimated fair value of these arrangements is minimal.

10. Equity and Stock-based Compensation

Subsidiary Stock and Non-Controlling Interests

FibroGen Europe

As of December 31, 2020 and 2019, respectively, FibroGen Europe had a total of 42,619,022 shares of Preferred Stock outstanding, of which there were 1,700,845 shares of Series A Preferred Stock, 1,875,000 shares of Series B Preferred Stock, 1,599,503 shares of Series C Preferred Stock, 1,520,141 shares of Series D Preferred Stock, 459,565 shares of Series E Preferred Stock, 5,714,332 shares of Series F Preferred Stock, 9,927,500 shares of Series G Preferred Stock and 19,822,136 shares of Series H Preferred Stock, all of which shares no longer have any right to be exchanged for FibroGen, Inc. Common Stock. The holders of FibroGen Europe's shares of Preferred Stock ("Preferred Shares") have the following rights, preferences and privileges:

Dividend Rights — When the assets of FibroGen Europe are distributed (except for distribution in a liquidation), Preferred Shares shall have the same rights to dividend or other forms of distribution as shares of Common Stock of FibroGen Europe. In the event of a merger, holders of Preferred Shares do not have the right to demand FibroGen Europe to redeem all or part of their Preferred Shares. FibroGen Europe may repurchase shares of Common Stock or Preferred Shares for consideration.

Pre-emptive Right — Preferred Shares shall have pre-emptive subscription right in accordance with the Finnish Limited Liability Companies Act if additional shares are issued, option rights are given, or convertible loan is taken, *provided*, *however*, that the foregoing pre-emptive right does not apply to a directed share issue, for which two thirds (2/3) of the voting shares represented at a general meeting of shareholders approve for an important legitimate cause.

Redemption Right — If a Preferred Share can be redeemed by a majority shareholder owning more than ninety percent (90%) of the shares of FibroGen Europe in accordance with the provisions of the Finnish Limited Liability Companies Act, the minority holders of Preferred Shares have the right to request redemption of their shares.

Voting Right — Each share has one vote. Preferred Shares have voting rights only in situations that are specifically provided in the Articles of Association, which include a merger transaction and directed share issue. In addition, Preferred Shares have right to vote in a general shareholder meeting for amending the Articles of Association if the amendment will affect the rights of Preferred Shares.

Conversion Right (1-for-1 basis into Common Stock of FibroGen Europe):

- Voluntary conversion right: Preferred Shares can be converted into common shares upon the written request of a shareholder provided that the conversion is feasible within the maximum and minimum amounts of shares of classes of FibroGen Europe as set forth in its Articles of Association. Such request can be withdrawn before the notification of conversion is filed with the Finnish Trade Register.
- Compulsory conversion right: Preferred Shares will be converted into common shares if (i) FibroGen Europe's shares are listed in a stock exchange or other trading system in the European Economic Area, or (ii) FibroGen Europe's recombinant collagen and gelatin production technology is being put into commercial use in the area of Europe and certain other European states. Commercial use means there is income generated from the first commercial sale of the products incorporating the above mentioned technology and does not include license fees, development financing, milestone payments or income from test products or equipment used in research. The board of directors of FibroGen Europe shall notify the shareholders of the compulsory conversion in writing, and the shareholders shall request to convert their shares within the timeframe provided in the notification. Should the shareholders fail to make the conversion request within the time limit, FibroGen Europe may redeem the shares of such shareholders.

Liquidation Right — In the event of a dissolution of FibroGen Europe, holders of Preferred Shares are entitled to be paid in an amount equal to the subscription price of the shares before any distribution is made to holders of common shares. Among holders of Preferred Shares, holders of shares of Series F Preferred Stock are entitled to be paid in an amount equal to the subscription price of Series F Preferred Stock before any distribution is made to holders of other Preferred Shares.

FibroGen Cayman

FibroGen Cayman had 6,758,000 Series A Preference Shares outstanding as of December 31, 2020 and 2019, respectively. The holders of the FibroGen Cayman Series A Preference Shares have the following rights, preferences and privileges:

Liquidation — In the event of liquidation, dissolution, or winding up of the Company, either voluntary or involuntary, including by means of a merger, the holders of FibroGen Cayman Series A Preference Shares are entitled to be paid an amount equal to the product of the number of shares held by a holder of shares of FibroGen Cayman Series A Preference Shares and the original issue price of $1.00 (subject to equitable adjustment for any stock dividend, combination, split, reclassification, recapitalization) plus all declared and unpaid dividends thereon.

Conversion — Each share of FibroGen Cayman Series A Preference Shares is convertible into the number of fully paid and non-assessable shares of Common Stock of FibroGen Cayman that results from dividing the original issue price by the conversion price in effect at the time of the conversion, subject to adjustments for stock splits, stock dividends, reclassifications and like events. The FibroGen Cayman Series A Preference Shares have a conversion price that is equal to the original issuance price such that the conversion ratio to FibroGen Cayman Common Stock is 1:1 as of all periods presented.

Voting — The holders of FibroGen Cayman Series A Preference Shares are entitled to vote together with the FibroGen Cayman Common Stock holders on all matters submitted for a vote of the stockholders. The holder of each share of FibroGen Cayman Series A Preference Shares has the number of votes equal to the number of shares of FibroGen Cayman Common Stock into which it is convertible.

Dividends — The holders of FibroGen Cayman Series A Preference Shares are entitled to receive cash dividends when and if declared, at a rate of 6%.

Non-Controlling Interests

Non-controlling interest positions related to the issuance of subsidiary stock as described above are reported as a separate component of consolidated equity from the equity attributable to the Company's stockholders at December 31, 2020 and 2019. In addition, the Company does not allocate losses to the non-controlling interests as the outstanding shares representing the non-controlling interest do not represent a residual equity interest in the subsidiary. Upon the initial public offering and as described above, all eligible FibroGen Europe preferred shares were exchanged for 958,996 shares of FibroGen Common Stock. No other FibroGen Europe shares have the right to be exchanged for FibroGen, Inc. Common Stock.

Common Stock

Each share of Common Stock is entitled to one vote. The holders of Common Stock are also entitled to receive dividends whenever funds are legally available and when declared by the board of directors, subject to the prior rights of holders of all classes of stock outstanding.

Shares of Common Stock outstanding, shares of stock plans outstanding and shares reserved for future issuance related to stock options and RSU grants and the Company's Employee Stock Purchase Plan ("ESPP") purchases are as follows (in thousands):

	December 31,	
	2020	2019
Common stock outstanding	91,441	87,657
Stock options outstanding	9,290	10,018
RSUs outstanding	1,893	1,483
Shares reserved for future stock options and RSUs grant	7,910	7,725
Shares reserved for future ESPP offering	4,070	3,337
Total shares of common stock reserved	114,604	110,220

Stock Plans

Stock Option and RSU Plans

Under the Company's Amended and Restated 2005 Stock Plan ("2005 Stock Plan"), the Company may issue shares of Common Stock and options to purchase Common Stock and other forms of equity incentives to employees, directors and consultants. Options granted under the 2005 Stock Plan may be incentive stock options or nonqualified stock options. Incentive stock options ("ISO") may be granted only to employees and officers of the Company. Nonqualified stock options ("NSO") and stock purchase rights may be granted to employees, directors and consultants. The board of directors has the authority to determine to whom options will be granted, the number of options, the term and the exercise price. Options are to be granted at an exercise price not less than fair market value for an ISO or an NSO. Options generally vest over four years. Options expire no more than 10 years after the date of grant. Upon the effective date of the registration statement related to the Company's initial public offering, the 2005 Plan was amended to cease the grant of any additional awards thereunder, although the Company will continue to issue common stock upon the exercise of previously granted stock options under the 2005 Plan.

In September 2014, the Company adopted a 2014 Equity Incentive Plan (the "2014 Plan") which became effective on November 13, 2014. The 2014 Plan is the successor equity compensation plan to the 2005 Plan. The 2014 Plan will terminate on November 12, 2024. The 2014 Plan provides for the grant of incentive stock options, nonqualified stock options, restricted stock awards, stock appreciation rights, performance stock awards, performance cash awards, restricted stock units and other stock awards to employees, directors and consultants. Stock options granted must be at prices not less than 100% of the fair market value at date of grant. Option vesting schedules are determined by the Company at the time of issuance and generally have a four year vesting schedule (25% vesting on the first anniversary of the vesting base date and quarterly thereafter over the next 3 years). Options generally expire ten years from the date of grant unless the optionee is a 10% stockholder, in which case the term will be five years from the date of grant. Unvested options exercised are subject to the Company's repurchase right. Shares reserved for issuance increases on January 1 of each year commencing on January 1, 2016 and ending on January 1, 2024 by the lesser of (i) the amount equal to 4% of the number of shares issued and outstanding on December 31 immediately prior to the date of increase or (ii) such lower number of shares as may be determined by the board of directors. As of December 31, 2020, the Company has reserved 7,909,854 shares of its common stock that remains unissued for issuance under the 2014 Plan.

Issuance of shares upon share option exercise or share unit conversion is made through issuance of new shares authorized under the plan.

Certain Common Stock option holders have the right to exercise unvested options, subject to a right held by the Company to repurchase the stock, at the original exercise price, in the event of voluntary or involuntary termination of employment of the stockholder. The shares are generally released from repurchase provisions ratably over four years. The Company accounts for the cash received in consideration for the early exercised options as a liability. At December 31, 2020 and 2019, no shares of Common Stock were subject to repurchase by the Company.

Stock option transactions, including forfeited options granted under the 2014 Plan as well as prior plans, are summarized below:

	Shares (In thousands)	Weighted Average Exercise per Share	Weighted Average Remaining Contractual Life (In Years)	Aggregate Intrinsic Value (In thousands)
Outstanding at December 31, 2019	10,018	$ 26.63		
Granted	2,692	31.55		
Exercised	(3,113)	10.73		
Expired	(73)	39.92		
Forfeited	(234)	40.11		
Outstanding at December 31, 2020	9,290	32.94	6.60	$ 86,013
Vested and expected to vest, December 31, 2020	8,929	32.76	6.50	84,125
Exercisable at December 31, 2020	5,576	$ 29.50	5.10	$ 66,943

The total intrinsic value of options exercised during the years ended December 31, 2020, 2019 and 2018 was $89.6 million, $59.2 million, and $97.5 million, respectively.

The following table summarizes RSU activity:

	Shares (In thousands)	Fair Value at Grant
Unvested at December 31, 2019	1,483	$ 49.05
Granted	1,354	29.99
Vested	(813)	45.55
Forfeited	(131)	39.25
Unvested at December 31, 2020	1,893	$ 37.60

Among the vested RSUs during the year ended December 31, 2020, 526,055 shares were released and issued, while the remaining was withheld for the related payroll taxes. The estimated weighted-average fair value of the awards granted during the years ended December 31, 2020, 2019 and 2018 was $29.99, $54.74 and $53.69, respectively.

ESPP

In September 2014, the Company adopted a 2014 ESPP that became effective on November 13, 2014. The 2014 ESPP is designed to enable eligible employees to periodically purchase shares of the Company's common stock at a discount through payroll deductions of up to 15% of their eligible compensation, subject to any plan or IRS limitations. At the end of each offering period, employees are able to purchase shares at 85% of the lower of the fair market value of the Company's common stock on the first trading day of the offering period or on the last day of the offering period. Purchases are accomplished through participation in discrete offering periods. The 2014 ESPP is intended to qualify as an ESPP under Section 423 of the Internal Revenue Code. The Company has reserved 1,600,000 shares of its common stock for issuance under the 2014 ESPP and shares reserved for issuance increases January 1 of each year commencing January 1, 2016 by the lesser of (i) a number of shares equal to 1% of the total number of outstanding shares of common stock on December 31 immediately prior to the date of increase; (ii) 1,200,000 shares or (iii) such number of shares as may be determined by the board of directors. There were 143,876 shares, 135,115 shares and 230,317 shares purchased by employees under the 2014 Purchased Plan for the years ended December 31, 2020, 2019 and 2018, respectively.

The expected term of 2014 ESPP shares is the average of the remaining purchase periods under each offering period.

Stock-Based Compensation

Stock-based compensation expense was recorded directly to research and development and selling, general and administrative expense for the years ended December 31, 2020, 2019 and 2018 was as follows (in thousands):

	Years Ended December 31,		
	2020	2019	2018
Research and development	$ 46,229	$ 41,015	$ 30,491
Selling, general and administrative	26,491	25,252	21,651
Total stock-based compensation expense	$ 72,720	$ 66,267	$ 52,142

The Company estimates the fair value of stock options using the Black-Scholes option valuation model. The fair value of employee stock options is being amortized on a straight-line basis over the requisite service period of the awards. The fair market value of common stock is based on the closing price of the Company's common stock as reported on the NASDAQ Global Select Market on the date of the grant.

The fair value of employee stock-based compensation is estimated using the following assumptions:

- Expected Term. Expressed as a weighted-average, the expected life of the options is based on the average period the stock options are expected to be outstanding and was based on the Company's historical information of the option exercise patterns and post-vesting termination behavior as well as contractual terms of the instruments.
- Expected Volatility. The Company considers its historical volatility data for volatility considerations for its ESPP. Historically, the expected volatility for all other stock-based compensation was based upon a blend of the Company's and comparable public entities' historical volatility. Since the third quarter of 2020, the expected volatility for all other stock-based compensation is currently based upon the Company's historical volatility data.
- Risk-Free Interest Rate. Expressed as a weighted-average, the risk-free interest rate assumption is based on the U.S. Treasury instruments whose term was consistent with the expected term of the Company's stock options.
- Expected Dividend Yield. The Company has never declared or paid any cash dividends and does not plan to pay cash dividends in the foreseeable future.

The assumptions used to estimate the fair value of stock options granted and ESPPs using the Black-Scholes option valuation model were as follows:

	Years Ended December 31,		
	2020	2019	2018
Stock Options			
Expected term (in years)	5.7	5.3	5.4
Expected volatility	67.1 %	68.0 %	67.9 %
Risk-free interest rate	0.8 %	2.4 %	2.7 %
Expected dividend yield	—	—	—
Weighted average estimated fair value	$ 18.36	$ 31.98	$ 32.12
ESPPs			
Expected term (in years)	0.5 - 2.0	0.5 - 2.0	0.5 - 2.0
Expected volatility	47.5 - 77.1 %	48.1 - 62.1 %	47.3 - 75.3 %
Risk-free interest rate	0.1 - 2.9 %	1.3 - 2.9 %	0.8 - 2.9 %
Expected dividend yield	—	—	—
Weighted average estimated fair value	$ 17.53	$ 19.27	$ 16.27

As of December 31, 2020, there was $63.9 million of total unrecognized compensation costs, net of estimated forfeitures, related to non-vested stock option awards granted that will be recognized on a straight-line basis over the weighted-average period of 2.59 years. As of December 31, 2020, there was $55.5 million of total unrecognized compensation costs, net of estimated forfeitures, related to non-vested RSUs granted that will be recognized on a straight-line basis over the weighted-average period of 2.73 years.

Warrants

During the year ended December 31, 2019, a warrant to purchase 4,430 shares of our common stock was exercised and there was no warrant to purchase shares of Common Stock outstanding at December 31, 2020 and 2019.

11. Net Loss Per Share

The following weighted impacts of outstanding securities were excluded from the calculation of diluted net loss per share because their effect would have been anti-dilutive for the three years presented (in thousands):

	Years Ended December 31,		
	2020	2019	2018
Employee stock options	6,694	7,602	7,815
RSUs	564	1,187	820
ESPP	306	260	195
Warrants	—	1	4
	7,564	9,050	8,834

12. FibroGen, Inc. 401(k) Plan

Substantially all of the Company's full-time U.S.-based employees are eligible to make contributions to the Company's 401(k) Plan. Under this plan, participating employees may defer up to 60% of their pretax salary during the year, but not more than statutory limits. The Company may elect to match employee contributions. Matching contributions of $3.2 million, $3.0 million and $2.9 million were made during years ended December 31, 2020, 2019 and 2018, respectively.

13. Income Taxes

The components of loss before income taxes are as follows (in thousands):

	Years Ended December 31,		
	2020	2019	2018
Domestic	$ (195,617)	$ 2,538	$ (38,472)
Foreign	6,686	(79,180)	(47,644)
Loss before provision for income taxes	$ (188,931)	$ (76,642)	$ (86,116)

The provision for income taxes consists of the following (in thousands):

	Years Ended December 31,		
	2020	2019	2018
Current:			
Federal	$ —	$ —	$ —
State	—	—	2
Foreign	360	328	302
Total current	360	328	304
Deferred:			
Federal	—	—	—
State	—	—	—
Foreign	—	—	—
Total deferred	—	—	—
Total provision for income taxes	$ 360	$ 328	$ 304

The following is the reconciliation between the statutory federal income tax rate and the Company's effective tax rate:

	Years Ended December 31,		
	2020	2019	2018
Tax at statutory federal rate	21.0%	21.0%	21.0%
State tax	—%	—%	—%
Stock-based compensation expense	2.4%	6.3%	14.5%
Benefit due to intercompany transfer of assets	41.7%	—%	—%
Valuation allowance on intercompany transfer of assets	(41.7)%	—%	—%
Net operating losses not benefitted	(23.2)%	(2.9)%	(23.2)%
Foreign net operating losses not benefitted	0.7%	(21.7)%	(11.6)%
Deduction limitation on executive compensation	(0.8)%	(2.5)%	(0.5)%
Other	(0.3)%	(0.6)%	(0.6)%
Total	(0.2)%	(0.4)%	(0.4)%

Significant components of the Company's deferred tax assets are as follows (in thousands):

	December 31,	
	2020	2019
Federal and state net operating loss carryforwards	$ 134,033	$ 91,267
Tax credit carryforwards	62,465	52,243
Foreign net operating loss carryforwards	32,417	37,786
Stock-based compensation	10,399	11,159
Lease obligations	8,243	10,698
Reserves and accruals	5,875	5,353
Deferred revenue	13,550	13,323
Intangible assets	75,915	—
Other	—	284
Subtotal	342,897	222,113
Less: Valuation allowance	(337,824)	(213,847)
Net deferred tax assets	5,073	8,266
Fixed assets	(5,073)	(8,266)
Other	—	—
Net deferred tax liabilities	(5,073)	(8,266)
Total net deferred tax assets	$ —	$ —

A valuation allowance has been provided to reduce the deferred tax assets to an amount management believes is more likely than not to be realized. Expected realization of the deferred tax assets for which a valuation allowance has not been recognized is based on upon the reversal of existing temporary differences and future taxable income.

The valuation allowance increased by $124.0 million, $19.9 million and $34.4 million for the years ended December 31, 2020, 2019 and 2018, respectively. Due to uncertainty surrounding the realization of the favorable tax attributes in the future tax returns, the Company has established a valuation allowance against its otherwise recognizable net deferred tax assets.

During 2020, the Company transferred certain intellectual property rights relating to its Chinese business between its wholly owned subsidiaries that are based in different tax jurisdictions. The transferor entity was not subject to income taxes in its local jurisdiction. The acquiring entity of the intellectual property is entitled to amortize the acquisition price of the intangible assets for tax purposes. In accordance with ASU 2016-16, *Intra-Entity Transfers of Assets Other Than Inventory*, the Company recognized a deferred tax asset of $78.7 million for the temporary difference arising from the acquirer's excess tax basis. Furthermore, based upon the weight of available evidence, the Company recognized a full valuation allowance against this deferred tax asset since it does not currently believe that realization of this gross deductible temporary difference is more likely than not. Accordingly, this inter-company transfer did not have a material impact to the Company's consolidated financial statements.

At December 31, 2020, the Company had net operating loss carryforwards available to offset future taxable income of approximately $606.8 million and $133.6 million for federal and state tax purposes, respectively. These carryforwards will begin to expire in 2026 for federal and 2021 for state purposes, if not utilized before these dates. The Company also had foreign net operating loss carryforwards of approximately $172.9 million which expire between 2021 and 2030 if not utilized.

At December 31, 2020, the Company had approximately $66.9 million of federal and $32.9 million of California research and development tax credit and other tax credit carryforwards available to offset future taxable income. The federal credits begin to expire in 2021 and the California research credits have no expiration dates.

Federal and state tax laws impose substantial restrictions on the utilization of net operating loss and credit carryforwards in the event of an “ownership change” for tax purposes, as defined in IRC Section 382. The Company reviewed its stock ownership for year ended December 31, 2020 and concluded no ownership changes occurred which would result in a reduction of its net operating loss or in its research and development credits expiring unused. If additional ownership change occurs, the utilization of net operating loss and credit carryforwards could be significantly reduced.

Uncertain Tax Positions

The Company had unrecognized tax benefits of approximately $48.6 million as of December 31, 2020. Approximately $0.5 million of unrecognized tax benefits, if recognized, would affect the effective tax rate. The interest accrued as of December 31, 2020 and 2019 was immaterial.

A reconciliation of the beginning and ending amounts of unrecognized income tax benefits during the three years ended December 31, 2020 is as follows (in thousands):

	Federal and State
Balance as of December 31, 2017	$ 23,361
Increase due to prior positions	379
Increase due to current year position	4,216
Balance as of December 31, 2018	27,956
Decrease due to prior positions	(111)
Increase due to current year position	4,418
Balance as of December 31, 2019	32,263
Decrease due to prior positions	(137)
Increase due to current year position	16,448
Balance as of December 31, 2020	$ 48,574

Unrecognized tax benefits may change during the next twelve months for items that arise in the ordinary course of business. The Company does not anticipate a material change to its unrecognized tax benefits over the next twelve months that would affect the Company’s effective tax rate.

The Company classifies interest and penalties as a component of tax expense, if any.

The Company files income tax returns in the U.S. federal jurisdiction, U.S. state and other foreign jurisdictions. The U.S. federal and U.S. state taxing authorities may choose to audit tax returns for tax years beyond the statute of limitation period due to significant tax attribute carryforwards from prior years, making adjustments only to carryforward attributes. The foreign statute of limitation generally remains open from 2011 to 2020. The Company is not currently under audit in any tax jurisdiction.

14. Related Party Transactions

Astellas is an equity investor in the Company and considered a related party. During the years ended December 31, 2020, 2019 and 2018, the Company recorded license and development revenue related to collaboration agreements with Astellas of $33.5 million, $158.8 million, and $35.2 million, respectively.

During the years ended December 31, 2020, 2019 and 2018, the Company also recorded drug product revenue from Astellas of $4.3 million, $(36.3) million, and $64.8 million, respectively. The drug product revenue from Astellas for the year ended December 31, 2020 included $8.2 million under the Japan Agreement, and a $4.0 million reduction to revenue as a change in estimated variable consideration at the time an updated listed price for roxadustat was issued by the Japanese Ministry of Health, Labour and Welfare related to roxadustat API sales in 2018. The drug product revenue from Astellas for the year ended December 31, 2019 included a change in estimated variable consideration that resulted in a $36.3 million reduction to revenue related to the product revenue of $64.8 million for API recorded in 2018. See Note 4, *Collaboration Agreements and Revenues*, for details.

During the years ended December 31, 2020, 2019 and 2018, the Company recorded expense related to collaboration agreements with Astellas of $0.5 million, $2.8 million and $1.5 million, respectively.

As of December 31, 2020 and 2019, accounts receivable from Astellas were $4.1 million and $4.8 million, respectively.

As of December 31, 2020 and 2019, total deferred revenue from Astellas were $7.5 million and $0.4 million, respectively.

As of December 31, 2019, prepaid expenses and other current assets from Astellas was $125.2 million of net unbilled contract assets, representing a $130.0 million unbilled contract asset related to two regulatory milestones under the Europe Agreement with Astellas associated with the planned MAA submission to the EMA, net of $4.8 million of associated deferred revenue. According to the Europe Agreement, this $130.0 million is not billable to Astellas until the submission of an MAA, therefore the net contract asset was included in the prepaid expenses and other current assets line on the Company’s consolidated balance sheet as of December 31, 2019. The $130.0 million was billed to Astellas upon the submission of an MAA in the second quarter of 2020. There was no such contract asset balance as of December 31, 2020. See Note 4, *Collaboration Agreements and Revenues*, for details.

As of December 31, 2020 and 2019, amounts due to Astellas were $1.1 million and $36.9 million, respectively. The amounts due are included in accrued liabilities and accounts payable on the consolidated balance sheets. The amount as of December 31, 2019 included the above-mentioned $36.3 million of a change in estimated variable consideration related to the API product revenue recognized in 2018, which was fully paid during the first quarter of 2020.

In September 2020, FibroGen Beijing and AstraZeneca completed the establishment of a jointly owned entity, Falikang, which was determined to be an unconsolidated VIE. As such, Falikang is accounted for as an equity method investment, and considered as a related party to the Company. The Company's total investments in Falikang was approximately $2.8 million, which is the total of the 51.1% of Falikang's equity and the acquisition costs. In addition, the Company recognized its proportionate share of the reported profits or losses of Falikang, beginning September 15, 2020, as other income (loss) in the consolidated statement of operations, and as an adjustment to its investment in unconsolidated subsidiary in the condensed consolidated balance sheet. Falikang has not incurred material profit or loss to date. As of December 31, 2020, the Company's equity method investment in Falikang was $2.7 million, and prepaid expenses and other current assets included its miscellaneous receivables of $0.9 million from Falikang. See Note 3, *Acquisition and Variable Interest Entity*, for details.

15. Segment and Geographic Information

The Company has determined that the chief executive officer is the chief operating decision maker ("CODM"). The CODM reviews financial information presented for the Company's various clinical trial programs as well as results on a consolidated basis. License revenues and development revenues received are not allocated to various programs for purposes of determining a profit measure and resource allocation decisions are made by the CODM based primarily on consolidated results. As such, the Company has concluded that it operates as one segment. Supplemental enterprise-wide information has been presented below.

Geographic Revenues

Geographic revenues, which are based on the bill-to region, are as follows (in thousands):

	Years Ended December 31,		
	2020	2019	2018
Europe	$ 67,161	$ 132,400	$ 112,916
Japan	36,660	122,475	100,002
China	72,498	1,700	—
All other	—	2	40
Total revenue	$ 176,319	$ 256,577	$ 212,958

Geographic Assets

Inventory by geographic location are as follows (in thousands):

	December 31,	
	2020	2019
United States	$ 4,715	$ —
China	11,815	6,887
Total inventory	$ 16,530	$ 6,887

Property and equipment, net by geographic location are as follows (in thousands):

	December 31,	
	2020	2019
United States	$ 20,673	$ 27,325
China	12,974	15,418
Total property and equipment	$ 33,647	$ 42,743

Finance lease right-of-use assets and operating lease right-of-use assets, net by geographic location are as follows (in thousands):

	December 31,	
	2020	2019
United States	$ 29,551	$ 39,237
China	55	365
Total finance lease right-of-use assets	$ 29,606	$ 39,602
United States	$ 47	$ 75
China	1,996	1,856
Total operating lease right-of-use assets	$ 2,043	$ 1,931

Customer Concentration

The Company's revenues to date have been generated from the following collaboration partners that respectively accounted for 10% or more of the Company's total revenue and accounts receivable:

	Percentage of Revenue			Percentage of Accounts Receivable	
	Years Ended December 31,			December 31,	
	2020	2019	2018	2020	2019
Astellas—Related party	21%	48%	47%	10%	17%
AstraZeneca	37%	52%	53%	26%	81%

The Company started selling roxadustat in China since late 2019 through a growing number of pharmaceutical distributors located in China. For the year ended December 31, 2020, the aggregate revenue from distributors represented 42% of the consolidated revenue, with no individual distributor representing over 10% of the total revenue. As of December 31, 2020, the aggregate accounts receivable from distributors represented 64% of the consolidated accounts receivable, with no material balance from any individual distributor. The aggregate revenue from distributors for the year ended December 31, 2019 and the aggregate accounts receivable from distributors as of December 31, 2019 were immaterial.

Schedule II: Valuation and Qualifying Accounts
(in thousands)

	Balance at Beginning of Year	Charged (Credited) to Statement of Operation	Charged to Other Accounts - Liabilities and Equity	Deductions, Net	Balance at End of Year
Valuation allowances for deferred tax assets					
Year ended December 31, 2020	$ 213,847	$ 123,977	$ —	$ —	$ 337,824
Year ended December 31, 2019	$ 193,987	$ 19,860	$ —	$ —	$ 213,847
Year ended December 31, 2018	$ 159,540	$ 34,447	$ —	$ —	$ 193,987
Allowances for rebates and discounts					
Year ended December 31, 2020	$ 1,102	$ 16,497	$ (14,867)	$ (2,184)	$ 548
Year ended December 31, 2019	$ -	$ 1,102	$ —	$ —	$ 1,102

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURES

None.

ITEM 9A. CONTROLS AND PROCEDURES

Attached as exhibits 31.1 and 31.2 to this Annual Report on Form 10-K are certifications of our Chief Executive Officer and our Chief Financial Officer required by Rule 13a-14(a) and 15d-15(e) promulgated under the Securities Exchange Act of 1934, as amended (the "Rule 13a-14(a) and 15d-15(e) Certifications"). This Controls and Procedures section of the Annual Report on Form 10-K includes the information concerning the controls evaluation referred to in the Rule 13a-14(a) and 15d-15(e) Certifications.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and our Chief Financial Officer, has evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2020, the end of the period covered by this Annual Report on Form 10-K. Disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the "Exchange Act")) are designed to provide reasonable assurance that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the U.S. Securities and Exchange Commission's rules and forms and that such information is accumulated and communicated to the company's management, including its Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

Based on our evaluation, the Chief Executive Officer and Chief Financial Officer have concluded that our disclosure controls and procedures were not effective as of December 31, 2020 because of the material weaknesses in our internal control over financial reporting described below.

Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as such term is defined in Rule 13a-15(f) of the Exchange Act. Our internal control over financial reporting is a process established under the supervision of and with the participation of our management, including our Chief Executive Officer and our Chief Financial Officer. 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. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. In addition, 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.

Management, with the participation and under the supervision of our Chief Executive Officer and our Chief Financial Officer, evaluated our internal control over financial reporting as of December 31, 2020, the end of our fiscal year, using the criteria established in *Internal Control - Integrated Framework (2013)* set forth by the Committee of Sponsoring Organizations of the Treadway Commission.

Based on our evaluation, our management has concluded that our internal control over financial reporting was not effective as of December 31, 2020 because of the material weaknesses in our internal control over financial reporting described below. A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of annual or interim financial statements will not be prevented or detected on a timely basis.

As of September 30, 2020, we have identified a material weakness in the risk assessment component of internal control as we did not appropriately design and maintain an effective risk assessment process at a precise enough level to identify new and evolving risks of material misstatement to the financial statements as a result of changes in our business operation. This material weakness gave rise to the following additional control deficiencies, which we also determined to be material weaknesses. We did not design and maintain effective controls related to the timely identification of shipments associated with drug product revenue, and we did not design and maintain effective controls related to the timely identification of changes in estimated variable consideration related to drug product revenue.

Each of these material weaknesses could result in material misstatements in the drug product revenue, contract asset or contract liability account balances or disclosures in our annual or interim consolidated financial statements that would not be prevented or detected.

The material weaknesses described above did not result in any material misstatements of our consolidated financial statements or disclosures, but did result in immaterial out-of-period adjustments to drug product revenue related to pre-commercial shipments of drug product, contract assets and contract liabilities, and related financial statement disclosures during the quarter ended September 30, 2020.

The effectiveness of the Company's internal control over financial reporting as of December 31, 2020 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report that appears herein.

Remediation Plan and Status

Our Board of Directors and management are committed to maintaining a strong internal control environment. We have developed a detailed remediation plan and are making progress of what will be a multi-step remediation process to fully remediate the material weaknesses described above. Specifically, as of December 31, 2020, we have started, and will continue to the process of the steps including, but not limited to, the following:

- We have performed a comprehensive risk assessment process, and will continue to refine the risk assessment, to identify and design our control activities related to the above mentioned material weaknesses;
- We have identified and designed new controls and procedures associated with drug product revenue, and where applicable implemented new procedures and controls during the fourth quarter of 2020, and will continue to implement new procedures and controls in the future; and
- We started the process to hire additional resources to strengthen our accounting and internal audit functions.

In addition, we will continue to assess risks on a continuous basis to timely identify new exposures or risk categories as business practices change, and we plan to conduct a comprehensive review and, as applicable, update our existing internal control framework to ensure that it has identified, developed and deployed the appropriate business process controls to meet the objectives and address the risks identified.

The material weaknesses will not be considered remediated until the applicable controls operate for a sufficient period of time and management has concluded, through testing, that these controls are operating effectively. We believe the measures described above will remediate these material weaknesses and strengthen our internal control over financial reporting. As we continue to evaluate and work to remediate these material weaknesses, we may determine to take additional measures to address these deficiencies or determine to modify certain of the remediation measures described above.

Limitations on the Effectiveness of Controls

In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply its judgment in evaluating the benefits of possible controls and procedures relative to their costs. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the most recent fiscal quarter ended December 31, 2020 that materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item is incorporated by reference to our Proxy Statement for our 2021 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2020.

Code of Conduct

We have adopted a Code of Business Conduct that applies to all of our directors, officers and employees. A copy of our Code of Business Conduct can be found on our website (www.FibroGen.com) under "Corporate Governance." The contents of our website are not a part of this report.

In addition, we intend to promptly disclose the nature of any amendment to, or waiver from, our Code of Business Conduct that applies to our principal executive officer, principal financial officer, principal accounting officer or persons performing similar functions on our website in the future.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated by reference to our Proxy Statement for our 2021 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2020.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item is incorporated by reference to our Proxy Statement for our 2021 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2020.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is incorporated by reference to our Proxy Statement for our 2021 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2020.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item is incorporated by reference to our Proxy Statement for our 2021 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2020.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) We have filed the following documents as part of this Annual Report on Form 10-K:

1. Consolidated Financial Statements

Information in response to this Item is included in Part II, Item 8 of this Annual Report on Form 10-K.

2. Financial Statement Schedules

Schedule II is included on page 168. All other schedules are omitted because they are not required or the required information is included in the consolidated financial statements or notes thereto.

3. Exhibits

See Item 15(b) below.

(b) ***Exhibits***—We have filed, or incorporated into this Annual Report on Form 10-K by reference, the exhibits listed below. Where an exhibit is incorporated by reference, the number in parentheses indicates the document to which cross-reference is made. Refer to the end of this table for a listing of cross-reference documents.

Exhibit Number	Exhibit Description	Incorporation By Reference			
		Form	SEC File No.	Exhibit	Filing Date
3.1	Amended and Restated Certificate of Incorporation of FibroGen, Inc.	8-K	001-36740	3.1	11/21/2014
3.2	Amended and Restated Bylaws of FibroGen, Inc.	S-1/A	333-199069	3.4	10/23/2014
4.1	Form of Common Stock Certificate.	8-K	001-36740	4.1	11/21/2014
4.2	Shareholders' Agreement by and among FibroGen International (Cayman) Limited and certain of its shareholders, dated as of September 8, 2017.	10-Q	001-36740	4.6	11/8/2017
4.3	Common Stock Purchase Agreement by and between FibroGen, Inc. and AstraZeneca AB, dated as of October 20, 2014.	S-1/A	333-199069	4.17	10/24/2014
4.4	Description of Capital Stock of FibroGen, Inc.	10-K	001-36740	4.4	3/2/2020
10.1(i)+	FibroGen, Inc. Amended and Restated 2005 Stock Plan.	S-1	333-199069	10.3(i)	10/1/2014
10.1(ii)+	Forms of stock option agreement, restricted stock purchase agreement and stock appreciation right agreement under the FibroGen, Inc. Amended and Restated 2005 Stock Plan.	S-1	333-199069	10.3(ii)	10/1/2014
10.1(iii)+	Form of stock option agreement under the FibroGen, Inc. Amended and Restated 2005 Stock Plan applicable to options exchanged pursuant to FibroGen, Inc.'s 2010 amendment and exchange offer.	S-1	333-199069	10.3(iii)	10/1/2014
10.1(iv)+	Form of 2010 amendment to the form of stock option agreement under the FibroGen, Inc. Amended and Restated 2005 Stock Plan applicable to options amended pursuant to FibroGen, Inc.'s 2010 amendment and exchange offer.	S-1	333-199069	10.3(iv)	10/1/2014

10.1(v)+	Form of 2013 amendment to the form of stock option agreement under the FibroGen, Inc. Amended and Restated 2005 Stock Plan applicable to options amended or exchanged pursuant to FibroGen, Inc.'s 2010 amendment and exchange offer.	S-1	333-199069	10.3(v)	10/1/2014
10.2+	FibroGen, Inc. 2014 Equity Incentive Plan and forms of agreement thereunder.	S-1/A	333-199069	10.4	11/12/2014
10.3+	FibroGen, Inc. 2014 Employee Stock Purchase Plan.	S-1/A	333-199069	10.5	11/12/2014
10.4+	FibroGen, Inc. Non-Employee Director Compensation Policy, as amended.	10-Q	001-36740	10.1	5/7/2020
10.5+	FibroGen, Inc. 2018 Bonus Plan.	8-K	001-36740	10.5	2/16/2018
10.6	Lease Agreement by and between FibroGen, Inc. and X-4 Dolphin LLC, dated as of September 22, 2006; as amended by First Amendment to Lease by and between FibroGen, Inc. and X-4 Dolphin LLC, dated as of October 10, 2007; as amended by Second Amendment to Lease by and between FibroGen, Inc. and X-4 Dolphin LLC, dated as of June 29, 2009; as amended by Third Amendment to Lease by and between FibroGen, Inc. and Are-San Francisco No. 43, LLC (as successor in interest to X-4 Dolphin LLC), dated as of May 19, 2011; as amended by Fourth Amendment to Lease by and between FibroGen, Inc. and Are-San Francisco No. 43, LLC, dated as of September 8, 2011.	S-1	333-199069	10.8	10/1/2014
10.7	Lease for Premises in Beijing BDA Biomedical Park by and among Beijing FibroGen Medical Technology Development Co., Ltd., Beijing Economic and Technology Investment Development Parent Company and Beijing BDA International Biological Pharmaceutical Investment Management Co., Ltd., effective as of February 1, 2013, as supplemented by the Supplementary Agreement to Lease of Premises in Beijing BDA Biomedical Park by and among Beijing FibroGen Medical Technology Development Co., Ltd., Beijing Economic Technology Investment Development Parent Company and Beijing BDA International Biological Pharmaceutical Investment Management Co., Ltd., dated as of January 30, 2013.	S-1	333-199069	10.9	10/1/2014
10.8+	Form of Employment Offer Letter.	S-1	333-199069	10.10	10/1/2014
10.9†	Collaboration Agreement, by and between FibroGen, Inc. and Astellas Pharma Inc., effective as of June 1, 2005.	10-Q	001-36740	10.1	11/5/2020

10.9(i)†	Amendment No. 1 to Collaboration Agreement, by and between FibroGen, Inc. and Astellas Pharma Inc., effective as of January 1, 2013.	10-K	001-36740	10.9(i)	2/27/2019
10.10†	Anemia License and Collaboration Agreement, by and between FibroGen, Inc. and Astellas Pharma Inc., effective as of April 28, 2006.	S-1	333-199069	10.12	10/1/2014
10.11†	Amendment to Anemia License and Collaboration Agreement, by and between FibroGen, Inc. and Astellas Pharma Inc., effective as of August 31, 2006.	S-1	333-199069	10.13	10/1/2014
10.12	Amendment No. 2 to Anemia License and Collaboration Agreement, by and between FibroGen, Inc. and Astellas Pharma Inc., effective as of December 1, 2006.	S-1	333-199069	10.14	10/1/2014
10.13†	Supplement to Anemia License and Collaboration Agreement, by and between FibroGen, Inc. and Astellas Pharma Inc., effective as of April 28, 2006.	S-1	333-199069	10.15	10/1/2014
10.14†	Amendment No. 3 to Anemia License and Collaboration Agreement, by and between FibroGen, Inc. and Astellas Pharma Inc., dated as of May 10, 2012.	S-1	333-199069	10.16	10/1/2014
10.15†	Amended and Restated License, Development and Commercialization Agreement (China) by and among FibroGen China Anemia Holdings, Ltd., Beijing FibroGen Medical Technology Development Co., Ltd., FibroGen International (Hong Kong) Limited and AstraZeneca AB, effective as of July 30, 2013.	10-Q	001-36740	10.3	11/5/2020
10.16†	Amended and Restated License, Development and Commercialization Agreement (for the U.S. and Certain Other Territories) by and between FibroGen, Inc. and AstraZeneca AB, effective as of July 30, 2013.	10-Q	001-36740	10.2	11/5/2020
10.17†	License Agreement by and between FibroGen, Inc. and the University of Miami and its School of Medicine, dated as of May 23, 1997.	10-Q	001-36740	10.4	11/5/2020
10.18†	First Amendment to May 23, 1997 License Agreement by and between FibroGen, Inc. and University of Miami, effective as of July 29, 1999.	10-Q	001-36740	10.5	11/5/2020
10.19	Research and Commercialization Agreement by and among FibroGen, Inc., GenPharm International Inc., Medarex, Inc. and FibroPharma, Inc., effective as of July 9, 1998.	S-1	333-199069	10.21	10/1/2014
10.20	Amendment No. 1 to Research and Commercialization Agreement by and among FibroGen, Inc., GenPharm International Inc., Medarex, Inc. and FibroPharma, Inc., effective as of June 30, 2001.	S-1	333-199069	10.22	10/1/2014

10.21†	Amendment No. 2 to Research and Commercialization Agreement by and among FibroGen, Inc., GenPharm International Inc., Medarex, Inc. and FibroPharma, Inc., effective as of January 28, 2002.	10-Q	001-36740	10.6	11/5/2020
10.22†	License Agreement by and between FibroGen, Inc. and the Dana-Farber Cancer Institute, Inc., effective as of March 29, 2006.	10-Q	001-36740	10.7	11/5/2020
10.23	Amendment No. 1 to License agreement by and between FibroGen, Inc. and Dana-Farber Cancer Institute, Inc., effective as of February 28, 2006.	S-1	333-199069	10.25	10/1/2014
10.24	Amendment No. 2 to License Agreement by and between FibroGen, Inc. and Dana-Farber Cancer Institute, Inc., effective as of March 14, 2006.	S-1	333-199069	10.26	10/1/2014
10.25+	Form of Indemnity Agreement by and between FibroGen, Inc. and its directors and officers.	S-1/A	333-199069	10.27	10/23/2014
10.26(i)†	Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of November 29, 2007.	S-1	333-199069	10.28(i)	10/1/2014
10.26(ii)†	Letter Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of June 26, 2008.	S-1	333-199069	10.28(ii)	10/1/2014
10.26(iii)†	Letter Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of August 18, 2008.	S-1	333-199069	10.28(iii)	10/1/2014
10.26(iv)†	Amendment No. 1 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of May 28, 2009.	S-1	333-199069	10.28(iv)	10/1/2014
10.26(v)†	Amendment No. 3 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of November 5, 2010.	S-1	333-199069	10.28(v)	10/1/2014
10.26(vi)†	Amendment No. 4 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of January 24, 2011.	S-1	333-199069	10.28(vi)	10/1/2014
10.26(vii)†	Amendment No. 5 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of April 15, 2011.	S-1	333-199069	10.28(vii)	10/1/2014
10.26(viii)†	Amendment No. 6 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of May 26, 2011.	S-1	333-199069	10.28(viii)	10/1/2014

10.26(ix)†	Amendment No. 7 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of January 1, 2012.	S-1	333-199069	10.28(ix)	10/1/2014
10.26(x)†	Amendment No. 8 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of July 10, 2012.	S-1	333-199069	10.28(x)	10/1/2014
10.26(xi)†	Amendment No. 9 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of November 26, 2012.	S-1	333-199069	10.28(xi)	10/1/2014
10.26(xii)†	Amendment No. 10 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of June 21, 2013.	S-1	333-199069	10.28(xii)	10/1/2014
10.26(xiii)†	Amendment No. 11 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of July 9, 2013.	S-1	333-199069	10.28(xiii)	10/1/2014
10.26(xiv)†	Amendment No. 12 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of August 1, 2013.	S-1	333-199069	10.28(xiv)	10/1/2014
10.26(xv)†	Amendment No. 13 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of March 6, 2014.	S-1	333-199069	10.28(xv)	10/1/2014
10.26(xvi)†	Amendment No. 14 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of February 5, 2014.	S-1	333-199069	10.28(xvi)	10/1/2014
10.26(xvii)†	Amendment No. 15 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of October 20, 2014.	10-Q	001-36740	10.28(xvii)	11/12/2015
10.26(xviii)†	Amendment No. 16 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of December 8, 2014.	10-Q	001-36740	10.28(xviii)	11/12/2015
10.26(xix)†	Amendment No. 17 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of December 8, 2014.	10-Q	001-36740	10.28(xix)	11/12/2015

10.26(xx)†	Amendment No. 18 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of February 15, 2015.	10-Q	001-36740	10.28(xx)	11/12/2015
10.26(xxi)†	Amendment No. 19 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of March 1, 2015.	10-Q	001-36740	10.28(xxi)	11/12/2015
10.26(xxii)†	Amendment No. 20 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of June 1, 2015.	10-Q	001-36740	10.28(xxii)	11/12/2015
10.26(xxiii)†	Amendment No. 21 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of May 29, 2015.	10-Q	001-36740	10.28(xxiii)	11/12/2015
10.26(xxiv)†	Amendment No. 23 to the Process Development and Clinical Supply Agreement by and between FibroGen, Inc. and Boehringer Ingelheim Pharma GmbH & Co. KG, effective as of September 1, 2015.	10-Q	001-36740	10.28(xxiv)	11/12/2015
10.26(xxv)†	Amendment No. 22 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of April 14, 2016.	10-Q	001-36740	10.26(xxv)	8/8/2016
10.26(xxvi)†	Amendment No. 24 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, retroactively effective as of September 15, 2015.	10-Q	001-36740	10.26(xxvi)	8/8/2016
10.26(xxvii)†	Amendment No. 25 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, retroactively effective as of October 15, 2015.	10-Q	001-36740	10.26(xxvii)	8/8/2016
10.26(xxviii)†	Amendment No. 26 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of June 30, 2016.	10-Q	001-36740	10.26(xxviii)	8/8/2016
10.26(xxix)†	Amendment No. 27 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of July 25, 2016.	10-Q	001-36740	10.26(xxix)	11/8/2016
10.26(xxx)†	Amendment No. 28 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of September 22, 2016.	10-Q	001-36740	10.26(xxx)	11/8/2016

10.26(xxxi)†	Amendment No. 29 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of December 20, 2016.	10-K	001-36740	10.26(xxxi)	3/1/2017
10.26(xxxii)†	Amendment No. 30 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of December 20, 2016.	10-K	001-36740	10.26(xxxii)	3/1/2017
10.26(xxxiii)†	Amendment No. 31 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of March 2, 2017	10-Q	001-36740	10.26(xxxiii)	5/9/2017
10.26(xxxiv)†	Amendment No. 32 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of September 1, 2017	10-K	001-36740	10.26(xxxiv)	2/27/2018
10.26(xxxv)†	Work Order No. 1 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of September 1, 2017	10-K	001-36740	10.26(xxxv)	2/27/2018
10.26(xxxvi)†	Amendment No. 33 to the Process Development and Clinical Supply Agreement, by and between FibroGen, Inc. and Boehringer Ingelheim Biopharmaceuticals GmbH, effective as of January 4, 2019	10-Q	001-36740	10.26(xxxvi)	5/9/2019
10.27†	State-Owned Construction Land Use Right Granting Contract by and between FibroGen (China) Medical Technology Development Co., Ltd. and The Bureau of Land and Resources of Cangzhou, dated as of February 24, 2017	10-Q	001-36740	10.32	5/9/2017
10.28†	Commercial Supply Agreement by and between FibroGen, Inc. and Catalent Pharma Solutions, LLC, effective as of January 1, 2020	10-K	001-36740	10.28	3/2/2020
10.29†	Master Supply Agreement by and among FibroGen, Inc., Shanghai SynTheAll Pharmaceutical Co., Ltd. and STA Pharmaceutical Hong Kong Limited, effective March 2, 2020	8-K	001-36740	99.1	3/24/2020
10.30†	Amendment No.1 to Master Supply Agreement by and among FibroGen, Inc., Shanghai SynTheAll Pharmaceutical Co., Ltd. and STA Pharmaceutical Hong Kong Limited, effective May 11, 2020	10-Q	001-36740	10.2	8/6/2020

10.31†	Second Amended and Restated License, Development and Commercialization Agreement by and among FibroGen China Anemia Holdings, Ltd., FibroGen China Medical Technology Development Co., Ltd., FibroGen International (Hong Kong) Limited, and AstraZeneca AB, effective July 1, 2020	10-Q	001-36740	10.3	8/6/2020
10.32†	Amendment No. 1 to the Amended and Restated License, Development and Commercialization Agreement by and between FibroGen, Inc. and AstraZeneca AB, effective July 1, 2020	10-Q	001-36740	10.4	8/6/2020
10.33†	Amendment No. 2 to Master Supply Agreement by and among FibroGen, Inc., Shanghai SynTheAll Pharmaceutical Co., Ltd. and STA Pharmaceutical Hong Kong Limited, effective July 24, 2020	10-Q	001-36740	10.8	11/5/2020
10.34†	Master Supply Agreement by and between FibroGen, Inc. and AstraZeneca UK Limited, effective September 10, 2020	10-Q	001-36740	10.9	11/5/2020
10.35*†	Master Services Agreement by and between FibroGen, Inc. and Samsung Biologics Co., Ltd., effective as of October 30, 2020	—	—	—	—
10.36*†	Product Specific Agreement by and between FibroGen, Inc. and Samsung Biologics Co., Ltd., effective as of October 30, 2020	—	—	—	—
10.37+	Offer Letter, by and between FibroGen, Inc. and Pat Cotroneo, dated as of October 23, 2000.	S-1	333-199069	10.31	10/1/2014
10.38+	Offer Letter, by and between FibroGen, Inc. and K. Peony Yu, dated as of November 21, 2008.	S-1	333-199069	10.30	10/1/2014
10.39+	Offer Letter, by and between FibroGen, Inc. and James Schoeneck, dated as of September 18, 2019.	10-Q	001-36740	10.7	11/12/2019
10.40+	Offer Letter, by and between FibroGen, Inc. and Christine Chung, dated as of June 17, 2008.	10-K	001-36740	10.32	3/2/2020
10.41+	Offer Letter, by and between FibroGen, Inc. and Elias Kouchakji, dated as of January 24, 2014.	10-K	001-36740	10.33	3/2/2020
10.42+	Offer Letter, by and between FibroGen, Inc. and Enrique Conterno, dated as of December 17, 2019.	10-K	001-36740	10.34	3/2/2020
10.43+	Offer Letter, by and between FibroGen, Inc. and Thane Wettig, dated as of May 7, 2020.	10-Q	001-36740	10.1	8/6/2020
10.44*+	Offer Letter, by and between FibroGen, Inc. and Mark Eisner, dated as of October 22, 2020.	—	—	—	—
10.45+	Form of Executive Officer Change in Control and Severance Agreement	10-K	001-36740	10.35	3/2/2020
21.1*	Subsidiaries of FibroGen, Inc.	—	—	—	—
23.1*	Consent of PricewaterhouseCoopers LLP.	—	—	—	—

24.1*	Power of Attorney (included in signature pages).	—	—	—	—
31.1*	Certification of Chief Executive Officer, as required by Rule 13a-14(a) or Rule 15d-14(a).	—	—	—	—
31.2*	Certification of Chief Financial Officer, as required by Rule 13a-14(a) or Rule 15d-14(a).	—	—	—	—
32.1*	Certification of Principal Executive Officer and Principal Financial Officer, as required by Rule 13a-14(b) or Rule 15d-14(b) and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350)(1).	—	—	—	—
101.INS*	Inline XBRL Instance Document	—	—	—	—
101.SCH*	Inline XBRL Taxonomy Schema Linkbase Document	—	—	—	—
101.CAL*	Inline XBRL Calculation Linkbase Document	—	—	—	—
101.DEF*	Inline XBRL Definition Linkbase Document	—	—	—	—
101.LAB*	Inline XBRL Labels Linkbase Document	—	—	—	—
101.PRE*	Inline XBRL Taxonomy Presentation Linkbase Document	—	—	—	—
104	Cover Page Interactive Data File (embedded within the inline XBRL document)	—	—	—	—

* Filed herewith.

† Portions of this exhibit (indicated by asterisks) have been omitted as the Company has determined that (i) the omitted information is not material and (ii) the omitted information would likely cause competitive harm if publicly disclosed.

\+ Indicates a management contract or compensatory plan.

(1) This certification accompanies the Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of FibroGen, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.

(c) ***Financial Statement Schedules***—See (a) 2 above. All other financial statement schedules are omitted because they are not applicable because the requested information is included in the consolidated financial statements or notes thereto.

ITEM 16. FORM 10-K SUMMARY

None

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of San Francisco, State of California.

FIBROGEN, INC.

Date: March 1, 2021	By:	/s/ Enrique Conterno Enrique Conterno Chief Executive Officer *(Principal Executive Officer)*
Date: March 1, 2021	By:	/s/ Pat Cotroneo Pat Cotroneo Senior Vice President, Finance and Chief Financial Officer *(Principal Financial and Accounting Officer)*

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Enrique Conterno and Pat Cotroneo, jointly and severally, his or her attorneys-in-fact, each with the power of substitution, for him or her in any and all capacities, to sign any amendments to this Annual Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact, or his substitute or substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements 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 dates indicated.

Signature	Title	Date
/s/ Enrique Conterno **Enrique Conterno**	Chief Executive Officer *(Principal Executive Officer)*	March 1, 2021
/s/ Pat Cotroneo **Pat Cotroneo**	Senior Vice President, Finance and Chief Financial Officer *(Principal Financial and Accounting Officer)*	March 1, 2021
/s/ James A. Schoeneck **James A. Schoeneck**	Chairman of the Board and Director	March 1, 2021
/s/ Suzanne Blaug **Suzanne Blaug**	Director	March 1, 2021
/s/ Aoife Brennan, M.B., B.Ch. **Aoife Brennan, M.B., B.Ch.**	Director	March 1, 2021
/s/ Benjamin F. Cravatt, Ph.D. **Benjamin F. Cravatt, Ph.D.**	Director	March 1, 2021
/s/ Jeffrey L. Edwards **Jeffrey L. Edwards**	Director	March 1, 2021
/s/ Jeffrey W. Henderson **Jeffrey W. Henderson**	Director	March 1, 2021
/s/ Maykin Ho, Ph.D. **Maykin Ho, Ph.D.**	Director	March 1, 2021
/s/ Thomas F. Kearns Jr. **Thomas F. Kearns Jr.**	Director	March 1, 2021
/s/ Kalevi Kurkijärvi, Ph.D. **Kalevi Kurkijärvi, Ph.D.**	Director	March 1, 2021
/s/ Gerald Lema **Gerald Lema**	Director	March 1, 2021
/s/ Rory B. Riggs **Rory B. Riggs**	Director	March 1, 2021

[*] = Certain confidential information contained in this document, marked by brackets, has been omitted because it is both (i) not material and (ii) would likely cause competitive harm to the company if publicly disclosed.

Exhibit 10.35

MASTER SERVICES AGREEMENT

between

SAMSUNG BIOLOGICS CO., LTD.

and

FIBROGEN, INC.

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[*] = Certain confidential information contained in this document, marked by brackets, has been omitted because it is both (i) not material and (ii) would likely cause competitive harm to the company if publicly disclosed.

MASTER SERVICES AGREEMENT

This Master Services Agreement (this "**MSA**") is entered into as of the date of the last signature below, and is effective as of October 30, 2020 (the "**Effective Date**") by and between FibroGen, Inc., a Delaware corporation having its principal place of business at 409 Illinois Street, San Francisco, California, USA 94158 (**"Client"**), and Samsung Biologics Co., Ltd., a company with offices at [*] (**"SBL"**). Client and SBL are sometimes referred to herein individually as a **"Party"** and collectively as the **"Parties"**.

WHEREAS, Client and SBL entered into the binding Technology Transfer Agreement with effective date September 18, 2020 ("**TTA**"); and

WHEREAS, Client and SBL wish to enter into a business relationship whereby SBL will provide Client with certain biologics manufacturing and/or development services, as contemplated by the TTA.

NOW, THEREFORE, in consideration of the mutual promises, covenants and agreements hereinafter set forth and for other valuable consideration, the Parties agree as follows:

SECTION 1 DEFINITIONS

Each of the following capitalized terms as used in this MSA, whether in the singular or plural, shall have the respective meanings set forth below.

1.1 "**Acceptance**" means the completion of the Acceptance Procedure by Client.

1.2 "**Acceptance Procedure**" means Client's Quality Assurance review, if applicable, and approval of SBL's Batch Related Documents, Certificate of Analysis, and Certificate of Compliance according to the applicable cGMP rules, regulations, standards, procedures, and QAA requirements, which typically commences following SBL's Release of a Batch to the Client.

1.3 "**Affected Party**" is defined in Section 17.3.

1.4 "**Affiliate**" means any corporation, company, partnership or other entity which directly or indirectly, controls, is controlled by or is under common control with a Party hereto. For purposes of this definition, a corporation or other entity shall be regarded as controlling another corporation or other entity if it owns or directly or indirectly controls more than [*] of the voting stock or other ownership interest of the corporation or other entity, or if possesses, directly or indirectly, the power to direct or cause the direction of the management and policies of the corporation or other entity or the power to elect or appoint more than [*] of the members of the governing body of the corporation or other entity.

1.5 "**Applicable Laws**" means any and all applicable laws, rules, regulations, regulatory authority guidance standards of any jurisdiction which are applicable to the Services in this MSA or any PSAs

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that may be in effect from time to time, and shall include all statutes, enactments, acts of legislature, laws, ordinances, rules, regulations, notifications, guidelines, directions, directives and orders of any Regulatory Authority, statutory authority, stock exchange, securities regulatory agency, tribunal, board, or court or any central or state government or local authority or other governmental entity in such jurisdictions.

1.6 "**Background IP**" means any Intellectual Property related to a Product and/or its use, or the Manufacture of such Product, in each case, which is owned and/or controlled by a Party prior to the PSA Effective Date for such Product or developed or obtained by such Party outside of or not relating to the performance of this MSA and any PSA, and without use of any Confidential Information or Intellectual Property of the other Party.

1.7 "**Batch**" means the quantity of Product Manufactured by SBL which results from a single run of the applicable Manufacturing Process.

1.8 "**Batch Record**" is defined in the applicable QAA.

1.9 "**Batch Related Documents**" means Manufacturing Documentation in support of the SBL's Release of a Product.

1.10 "**Binding Year**" shall be defined in the applicable PSA.

1.11 [*].

1.12 "**Cell Line**" means [*].

1.13 "**Certificate of Analysis**" is defined in the applicable QAA.

1.14 "**Certificate of Compliance**" is defined in the applicable QAA.

1.15 "**Change**" is defined in Section 6.1.

1.16 "**Client**" is defined in the preamble.

1.17 "**Client Materials**" means Client reagents and other materials supplied by Client or its third party supplier to be used in the Service hereunder, as each is further defined in the PSA and/or applicable QAA. In the case of a Drug Product PSA, Client Materials shall also include Drug Substance and/or other active pharmaceutical ingredients, which may or may not be Manufactured by SBL.

1.18 "**Client Technology**" means know-how, technology, research and other information of Client relating to the Client Materials, Manufacturing Process, including analytical methods, quality control

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analysis, specifications, transportation and storage requirements, provided by Client to SBL in connection with this MSA and applicable PSA.

1.19 "[*****]" has the meaning set forth in the PSA.

1.20 "**Clinical Product**" means a Drug Substance or Drug Product which is Manufactured by SBL pursuant to a PSA and which is to be used by Client in a research study or studies that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes.

1.21 "**Commercial Product**" means a Drug Substance or Drug Product which is Manufactured by SBL which is intended for commercial sale and use by humans and for importation or exportation into countries or regions designated in each PSA.

1.22 "**Commercially Reasonable Efforts**" means with respect to an activity to be carried out by a Party pursuant to this MSA, the carrying out of such activity in a diligent manner, and using efforts and resources comparable to the efforts and resources commonly used in the contract manufacturing of biologics (in the case of SBL) or in the biopharmaceutical industry (in the case of Client) by companies with resources and expertise similar to those of such Party. "Commercially Reasonable Efforts" requires prompt assignment of responsibility for such task or activity to specific qualified employee(s) and allocation of resources designed to advance progress with respect to such task or activity but does not require the taking of actions (i) [*], (ii) [*], or (iii) [*].

1.23 "**Critical Raw Materials**", "**Customized or Dedicated Raw Materials**" and "**Other Raw Materials**" shall be defined on a per-Product basis by the Core Team pursuant to 5.3.1.

1.24 "**Confidential Information**" means any confidential, trade secret or proprietary data, know-how and other information, whether technical or non-technical, of one Party that is disclosed by that Party (hereinafter the "**Disclosing Party**") or otherwise becomes known to the other Party (hereinafter the "**Receiving Party**") either under the Mutual Confidential Disclosure Agreement by and between the Parties, dated as of September 3, 2015 as amended, or hereunder in connection with this MSA or any PSA or QAA, regardless of form or manner of disclosure, i.e., whether disclosed in writing, in electric file or format or in other tangible manner, or orally, visually or in other intangible manner. Notwithstanding the foregoing, [*].

1.25 "**Core Manufacturing Services**" shall mean the Services that range from storage of cell bank vials, manufacturing of Drug Substance and preparation of the final Drug Product, as well as storage of intermediates of Drug Substance and Drug Product. [*]. [*].

1.26 "**Core Team**" is defined in Section 3.3.1.

1.27 "**Current Good Manufacturing Practices**" or "**cGMP**" means current good manufacturing practices and regulations applicable to the Manufacture of Product that are promulgated by any Regulatory Authority, including as promulgated under and in accordance with (i) the U.S. Federal Food, Drug and Cosmetic Act, Title 21 of the U.S. Code of Federal Regulations, Parts 210, 211, 600, 601 and 610, (ii) relevant EU legislation, including European Directive 2003/94/EC or national implementations of that Directive, (iii) relevant guidelines, including the EU Guidelines for Good Manufacturing Practices for Medicinal Products (Eudralex Vol. 4 and Annexes thereto), (iv) International Conference on Harmonization Good Manufacturing Practice Guide for Active Pharmaceuticals Ingredients and (v) and any analogous set of regulations, guidelines or standards as defined, from time to time, by any relevant Regulatory Authority having jurisdiction over the development, manufacture or commercialization of the Product, as applicable, in each case as in effect as of the date such manufacturing for the Product are or were conducted.

1.28 "**Damages**" means any damages, costs, expenses, fines, penalties (including reasonable attorneys' fees and costs), losses and liabilities.

1.29 "**Dispute**" is defined in Section 16.1.

1.30 "**Drug Product**" means a finished or intermediate dosage form that contains a Drug Substance, generally, but not necessarily, in association with one or more other ingredients.

1.31 "**Drug Substance**" means an active ingredient specified in the relevant PSA that is intended to furnish pharmacological activity or other direct effect in the diagnosis, cure, mitigation, treatment or prevention of disease or to affect the structure or any function of the human body, but does not include intermediates used in the synthesis of such ingredient.

1.32 "**Effective Date**" is defined in the preamble.

1.33 "**EMA**" means the European Medicines Agency, or any successor agency.

1.34 "**Engineering Batch**" means a Batch that is intended to demonstrate the transfer of the Manufacturing Process to the Facility, and may be conducted under cGMP.

1.35 "**Facility**" means one or more of the manufacturing facilities of SBL where the Services shall be performed, located [*].

1.36 "**FDA**" means the United States Food and Drug Administration or any successor agency thereto.

1.37 "**Firm Period**" means the portion of a forecast that is binding on both Parties as defined pursuant to the applicable PSA.

1.38 "**Force Majeure Event**" is defined in Section 17.3.

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1.39 "**Implementation Plan and Budget**" is defined in Section 6.2(b).

1.40 "**Indemnified Party**" is defined in Section 13.3.

1.41 "**Indemnifying Party**" is defined in Section 13.3.

1.42 "**Intellectual Property**" means (i) patents, patent rights, provisional patent applications, patent applications, designs, registered designs, registered design applications, industrial designs, industrial design applications and industrial design registrations, including any and all divisions, continuations, continuations-in-part, extensions, restorations, substitutions, renewals, registrations, revalidations, reexaminations, reissues or additions, including supplementary certificates of protection, of or to any of the foregoing items; (ii) copyrights, copyright registrations, copyright applications, original works of authorship fixed in any tangible medium of expression, including literary works (including all forms and types of computer software, including all source code, object code, firmware, development tools, files, records and data, and all documentation related to any of the foregoing), pictorial and graphic works; (iii) trade secrets, technology, developments, discoveries and improvements, know-how, proprietary rights, formulae, confidential and proprietary information, technical information, techniques, inventions, designs, drawings, procedures, processes, models, formulations, manuals and systems, whether or not patentable or copyrightable, including all biological, chemical, biochemical, toxicological, pharmacological and metabolic material and information and data relating thereto and formulation, clinical, analytical and stability information and data which have actual or potential commercial value and are not available in the public domain; (iv) trademarks, trademark registrations, trademark applications, service marks, service mark registrations, service mark applications, business marks, brand names, trade names, trade dress, names, logos and slogans, Internet domain names, and all goodwill associated therewith; and (v) all other intellectual property or proprietary rights, in each case whether or not subject to statutory registration or protection.

1.43 "**Invention**" is defined in Section 11.3.

1.44 "**Joint Steering Committee**" or "**JSC**" is defined in Section 3.2.1.

1.45 "**Manufacturing**" or to "**Manufacture**" means the manufacturing of the Product, and any services relating to such manufacturing, including, but not limited to, testing, quality control, documentation, archiving, and packaging, and up to release of the Product, to be performed by SBL at the Facility under the MSA and any applicable PSA.

1.46 "**Manufacturing Documentation**" means with respect to a given Product, the data acquired and generated, documents and records describing or otherwise related to the Manufacturing Process including, without limitation: documents and records consisting of or containing process descriptions, requirements and specifications; Client Materials and Specifications; analytical methods, process trend and variability data; validations protocols and reports; process development reports; Master Batch Record, executed Batch Records; Batch Related Documents, Product specific SOPs, final

Product and stability quality control testing (including all raw data), quality assurance, validation, storage and shipping.

1.47 "**Manufacturing Process**" means, with respect to a given Product, the mutually agreed production process and analytical methods for the Manufacturing of the Product pursuant to the applicable PSA, as summarily described in the applicable QAA and as described in the Manufacturing Documentation, as such process may be changed from time to time in accordance with the MSA.

1.48 "**Master Batch Record**" means a document that is approved by Client and contains processing instructions (such as the detailed step, in-process controls, raw materials, ranges, etc.) for the Manufacture of the Product to ensure uniformity from batch to batch. A terminology of Manufacturing Batch Record can be used when Master Batch Record (MBR) is issued for the batch execution.

1.49 "**Non-Affected Party**" is defined in Section 17.3.

1.50 "**Non-Conforming Product**" means a Batch of Product that fails to conform to the Specifications, cGMP (if applicable), and/or other mutually agreed upon written express requirements for SBL to follow under the applicable PSA and the applicable QAA.

1.51 [*].

1.52 "**Party**" and "**Parties**" is defined in the preamble.

1.53 "**Pilot Batch**" means a Batch of Product designated as a pilot Batch which shall not comply with cGMP and is not required to meet the Specifications.

1.54 "**Pre-Approval Inspection**" or "**PAI**" means an on-site inspection of the Facility by the Regulatory Authority prior to granting the Regulatory Approval for a Commercial Product as required by various Regulatory Authorities to ensure that the Manufacturing Process and the Facility meet the appropriate requirements and comply with cGMP.

1.55 "**Process Validation Batch**" means a Batch of Commercial Product produced from a process validation (process performance qualification, or PPQ) run conducted by SBL hereunder to (i) demonstrate and document the consistency and reproducibility of the Manufacturing Process at the Facility, and (ii) support the Regulatory Approval of both the Product Manufactured and the Manufacturing Process at the Facility.

1.56 "**Product**" means Clinical Product or Commercial Product (whether bulk Drug Substance or Drug Product) to be Manufactured by SBL pursuant to this MSA and any applicable PSA.

1.57 "**Product Purchase Commitment**" is defined in Section 5.7.

[*] = Certain confidential information contained in this document, marked by brackets, has been omitted because it is both (i) not material and (ii) would likely cause competitive harm to the company if publicly disclosed.

1.58 "**Product Specific Agreement**" or "**PSA**" is defined in Section 2.1.

1.59 "**Project Management Team Leader**" is defined in Section 3.3.2.

1.60 "**PSA Effective Date**" means the effective date of any PSA governed by this MSA.

1.61 "**Purchase Order**" is defined in Section 5.6.

1.62 "**Quality Agreement**" or "**QAA**" means that certain quality agreement that governs the responsibilities related to quality systems and quality requirements for the Product(s) Manufactured hereunder, including quality control, testing and release of such Product(s) at the Facility entered into by the Parties.

1.63 [*].

1.64 "**Quarter**" means each period of three (3) consecutive calendar months beginning on January 1, April 1, July 1, or October 1.

1.65 "**Raw Materials**" means those materials that are used in the Services, including, but not limited to, chemicals, reagents, filters, excipients, disposable consumables, and secondary packaging materials. Raw Materials exclude the Client Materials.

1.66 "**Reference Standards**" means standard materials prepared by Client and/or SBL in accordance with the applicable QAA.

1.67 "**Regulatory Approval**" means all approvals, licenses, registrations or authorizations thereof of any national, regional, state or local regulatory agency, department, bureau or other governmental entity in any jurisdiction where the Product is marketed or intended to be marketed, necessary for the manufacture and sale of the Product, which manufacturing includes the Manufacturing of the Products at the Facility.

1.68 "**Regulatory Authority**" means any national (e.g., the FDA), supra-national (e.g., the EMA), regional, state or local regulatory agency, department, bureau, commission, council or other governmental entity, in any jurisdiction responsible for granting the Regulatory Approval.

1.69 "**SBL Assignable Error**" means [*].

1.70 "**SBL's Release**" means SBL's release of Product to Client based on testing and manufacturing conformance with Applicable Laws and cGMPs (as per the Certificate of Compliance), the Process Description, the QAA, the Master Batch Record (MBR) and the Specifications (as documented on the Certificate of Analysis).

[*] = Certain confidential information contained in this document, marked by brackets, has been omitted because it is both (i) not material and (ii) would likely cause competitive harm to the company if publicly disclosed.

1.71 "**Service**" or "**Services**" is defined in Section 2.1.

1.72 "**Service Fee**" is defined in Section 9.1.

1.73 "**Specification(s)**" means the criteria for the Products, Client Materials, or Raw Materials, as the case may be, which details are provided in documentation as reviewed and approved in writing by the Parties.

1.74 "**Standard Operating Procedure(s)**" or "**SOP(s)**" means the standard operating procedures established by and mutually agreed upon by the Parties regarding the Manufacturing Process, and any other SBL standard operating procedures that are used in the performance of Services under the MSA or any PSA.

1.75 [*].

1.76 "**Technology Transfer**" means the activities by the Parties necessary to Manufacture the Product for Client at the Facility and may include: (i) transfer of the Client Technology and Client Material from Client to SBL; (ii) implementation of the Manufacturing Process at the Facility, including establishing a small scale Manufacturing Process model at SBL; (iii) Manufacturing Process fit activities, including required small- and large-scale process development and validation work as allocated between the Parties to SBL and process engineering required to modify / equip, qualify and validate the Facility for the Manufacturing of the Commercial Product; (iv) stability testing, if applicable, for the Product required for licensure; (v) comparability testing to the appropriate reference product, and (vi) regulatory support for Regulatory Approvals.

1.77 "**Term**" is defined in Section 15.1.

1.78 "**Warehouse**" means SBL's warehouse for storage of the Product located at [*].

SECTION 2 RELATED AGREEMENTS AND EXHIBITS

2.1 **Product Specific Agreements.** Pursuant to one or more Product specific agreements entered into and mutually agreed from time to time by duly authorized representatives of the Parties (**"Product Specific Agreements"** or **"PSAs"**), SBL will perform Manufacturing Services for Client as specified in such PSAs and in accordance with the terms and conditions of this MSA (**"Services"**). Each PSA shall refer to this MSA and contain as applicable (i) a high level scope of work of the Services to be performed under such PSA which describes key activities, (ii) the Product for which SBL will perform such Services for Client, (iii) a description of the Cell Line; (iv) fees to be paid to SBL by Client for such Services with a general timing plan for invoicing and a more detailed plan to be provided where appropriate, (v) if such Services pertain to the Manufacture of the Product, the number of Batches of Product to be manufactured by SBL and delivered to Client and the

[*] = Certain confidential information contained in this document, marked by brackets, has been omitted because it is both (i) not material and (ii) would likely cause competitive harm to the company if publicly disclosed.

Specifications, (vi) any other deliverables, (vii) the Facility where such Services are to be performed, and (viii) the Regulatory Approvals to be obtained by the Parties. [*].

2.2 **Quality Agreement (QAA).** The Parties shall agree upon and finalize a Quality Agreement within a reasonable period time after the execution of each PSA, and such PSA and Quality Agreement shall be incorporated into this MSA. The Quality Agreement may be amended from time to time, subject to the JSC's approval followed by the Parties' written agreement pursuant to Section 17.10 (if applicable).

2.3 **Order of Precedence**. The Services shall be governed by the terms and conditions of this MSA, the applicable PSA, and any applicable Quality Agreement. In the event of a conflict between a Quality Agreement and either any provision of this MSA or any PSA, the MSA or PSA, respectively, shall control except with respect to Product quality terms, in which case, the Quality Agreement will control. In the event of a conflict between any provision of this MSA and the PSA, this MSA shall control, provided that the PSA shall control solely to the extent the PSA expressly states the Parties' intent to control as to a specific provision.

SECTION 3 MANAGEMENT OF SERVICE

3.1 **General.** Each Party will be responsible for its internal decision-making process and for reasonably informing the other Party of its decisions affecting the Services in a regular and timely manner. Without limiting the foregoing, the Parties shall establish the joint committees or teams set forth herein to advise the Parties on certain matters including, without limitation, the Facility modification, the Technology Transfer, and optimization of the Manufacturing operations relating to the Product.

3.2 **Joint Steering Committee.**

3.2.1 **Formation and Composition.** A joint steering committee will be formed for the Product (the "**Joint Steering Committee**" or "**JSC**") if the Parties mutually agree that such JSC is necessary. The JSC will be a cross-functional committee composed of an equal number of representatives appointed by each of Client and SBL with each of Client and SBL having [*], and with [*] from each of Client and SBL having oversight for quality activities, and with [*] from each of Client and SBL having oversight for manufacturing and supply chain activities, including the transfer and implementation of the Manufacturing Process at the Facility. Either Party may replace any or all of its representatives at any time by providing notice, in writing, of such replacement to the other Party. Each JSC representative (and any replacement therefor) shall have appropriate seniority, knowledge and experience to appropriately carry out its responsibilities on the JSC.

3.2.2 **Responsibilities.** The JSC shall (i) establish and oversee the governance structure for the Services, including the formation of the subcommittees herein; (ii) monitor any Facility modification and the Technology Transfer and Manufacturing strategy for the Product at the Facility, including strategies for the Regulatory Approval of the Facility to Manufacture the

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Product; (iii) provide strategic guidance to the Core Team; (iv) conduct high level project stage reviews with the Core Team at appropriate milestones or completion of key deliverables or a specified sequence of events to review and approve key deliverables and evaluate the Core Team's progress and performance, all in order to ensure that the Services are being implemented appropriately; (v) advise on and/or resolve business, manufacturing, supply chain, quality, regulatory or other issues unresolved at the Core Team level, including discussing any [*]; (vi) review and recommend for approval by the Parties any changes to the MSA or the applicable PSA; (vii) review and approve changes to the Services, Specifications, analytical methods, the Manufacturing Process, the Facility or equipment as escalated to the JSC by the Core Team or by a Party pursuant to Section 3.6 below; (viii) review completion of the Services; (ix) seek to settle Disputes unresolved by a subcommittee; and (x) perform such other functions as appropriate to further the purposes of the MSA as determined in writing by the Parties.

3.3 Core Team.

3.3.1 Formation and Composition. A core team for that Product (the "**Core Team**") will be formed. The Core Team shall be composed of an equal number of representatives from each of SBL and Client, with [*] appointed by each of Client and SBL. Such representatives will include the Project Management Team Leaders of Client and SBL as well as their representatives from manufacturing, technical operations, supply chain, quality assurance, quality control, regulatory affairs or other individuals with expertise and responsibilities for those functions required to execute the Facility modification, the Technology Transfer and Manufacturing. Either Party may replace any or all of its representatives at any time by providing notice, in writing, of such replacement to the other Party. Each Core Team representative (and any replacement therefor) shall have appropriate seniority, knowledge and experience to appropriately carry out its responsibilities on the Core Team.

3.3.2 Appointment of Project Management Team Leader. Each Party shall appoint a project management team leader (each, a "**Project Management Team Leader**") to act as the primary contact for such Party in connection with matters related to the Service. The Project Management Team Leaders, unless otherwise mutually agreed by the Parties, shall serve as the leaders of the Core Team. A Party may replace its Project Management Team Leader at any time and from time to time for any reason by providing notice, in writing, of such replacement to the other Party.

3.3.3 Responsibilities. The Core Team shall (i) monitor, review and manage the Services according to the MSA and applicable PSA; (ii) conduct project stage reviews with the JSC at appropriate milestones or completion of key deliverables or a specified sequence of events to review key deliverables and its progress and performance against plans; (iii) develop a change management process to identify, review and recommend to the JSC any changes in the project scope, time, fee or risk that are likely to be material to the Services; (iv) investigate and resolve business, manufacturing, supply chain, quality, regulatory or other issues arising during the Service, including any [*]; (v) review and escalate to the JSC, as needed, changes to the

applicable QAA; (vi) review and recommend to the JSC changes to the Services, Specifications, analytical methods, the Manufacturing Process, the Facility or equipment; (vii) coordinate the activities of the Parties relating to the Services hereunder, including but not limited to: managing the technical operations and quality aspects of routine manufacturing, conducting Product testing technical operations and quality aspects of routine manufacturing, conducting Product testing and release, and managing supply chain activities including shipping and delivery logistics; (viii) report periodically on operation and quality progress and performance; and (ix) perform such other tasks and undertake such other responsibilities as may be specifically delegated to the Core Team by mutual written agreement of the Parties.

3.4 Meetings.

3.4.1 JSC. The JSC shall meet by audio or video teleconference, or in person, as agreed by the JSC, on [*] as agreed by the Parties, or as necessary to make determinations as required of it. Any member of the JSC may designate a substitute to attend and perform the functions of that member at any meeting of the JSC and each Party may, in its reasonable discretion, invite non-member representatives of such Party to attend such meetings with advance written notice to the other Party. Either Party may request a meeting of the JSC, which shall occur as soon as reasonably necessary to address the stated purpose of the meeting. For clarity, the JSC will timely meet in a manner sufficient to address any urgent issues.

3.4.2 Core Team. The Core Team shall meet by audio or video teleconference, or in person, on a monthly basis, or as agreed by the Core Team. Any member of the Core Team may designate a substitute to attend and perform the functions of that member at any meeting of the Core Team and each Party may, in its reasonable discretion, invite non-member representatives of such Party to attend such meetings with advance written notice to the other Party. Either Party may request a meeting of the Core Team, which shall occur as soon as reasonably necessary, taking no longer than [*] to meet to address urgent issues, understanding that the issue may not be resolved within the [*], to address the stated purpose of the meeting.

3.4.3 Travel Expenses. Each Party shall be responsible for all of its own expenses of traveling to and participating in any joint committee or team meeting, including the JSC and Core Team.

3.5 Decisions. All decisions of the JSC, the Core Team and any other joint (sub)committee or team formed under the MSA or any applicable PSA, except as expressly set forth herein, shall be made by the unanimous agreement of all of its members or their designated representatives, and shall be reflected in written meeting reports which summarily address topics discussed, delegation of work, schedules and decision of such committee or team. Written reports of the JSC and Core Team shall be subject to approval by the authorized representatives of the Parties; provided, however, that no joint (sub)committee or team herein may amend or waive any provision of the MSA or applicable PSA, including without limitation, the financial terms set forth in Section 9. The MSA and any PSA may be amended, and any provision of the MSA or any PSA may be waived, pursuant to Section 17.10 only.

3.6 Disputes.

3.6.1 General. In the event that the Core Team and any other joint (sub)committee or team formed under the MSA or any applicable PSA, is unable, despite the good faith efforts of all members, to resolve a disputed issue that is within the purview of such joint (sub)committee or team within [*] following a meeting request therefor by either Party, the disputed issue shall be referred immediately by such joint committee or team to the JSC. If the disputed issue still cannot be resolved within [*] following such referral to the JSC, the matter shall be handled in accordance with Section 16.

3.6.2 Project Management Team Leaders. Subject to Section 3.6.1, the Project Management Team Leaders (or their respective designee) will in good faith attempt to mutually resolve in a timely fashion any disagreement with respect to the Services hereunder which could reasonably be expected to affect the quality of the Manufacturing of the Product, including without limitation, the related management processes and operations, control of production planning and scheduling, prioritization decisions, allocation of resources, timing of in-process and release testing, oversight of auxiliary facilities (e.g., in-process tests that need to be conducted at laboratories other than those at the Facility), Facility modification, the Technology Transfer, registration and troubleshooting decisions, and any other matters relating to implementation of the Manufacturing Process and the Manufacturing of the Product hereunder.

SECTION 4 SERVICES

4.1 Services. During the Term, in accordance with and subject to the terms and conditions set forth in this MSA, the applicable PSA, and the applicable QAA, SBL shall provide the Services to Client relating to the Product(s). SBL and Client shall at all times make Commercially Reasonable Efforts to complete the Services in accordance with the timelines set forth in the applicable PSA, except as otherwise expressly set forth in the MSA, applicable PSA, or the applicable QAA or as otherwise mutually agreed in writing by the Parties.

4.2 Compliance with Applicable Laws. Subject to the provisions of Section 6 below, SBL shall maintain the Facility in accordance with cGMP and in such condition as will allow SBL to Manufacture the Products in accordance with the terms of the MSA and the applicable QAA. SBL shall perform the Services under the MSA in conformance of cGMP, if applicable, any requirements of the Regulatory Authorities that shall be mutually agreed upon by the Parties, and all Applicable Laws.

4.3 Project Personnel. SBL shall adequately staff the Facility with personnel necessary (including consultants and contractors), and with sufficient technical expertise to perform its obligations under the MSA, and who are up to date on all required trainings under SBL policy and Applicable Laws. Notwithstanding anything to the contrary herein, and in addition to the JSC and Core Team meetings

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described in Section 3 above, Client and SBL may arrange for core project personnel to have regular meetings, which shall be by audio or video teleconference.

4.4 **Subcontract.** SBL may not subcontract any portion of the Services without prior written approval from the Client, which may not be unreasonably withheld, [*]. In the event SBL subcontracts any portion of the Services, SBL shall be primarily obligated to Client for any subcontracted Services as if it were providing the Services itself. [*].

4.5 **Development and Manufacturing Site.** Unless otherwise agreed by Client in writing, all Services shall be performed by SBL at the Facility.

4.6 **Manufacturing Documentation**. SBL shall maintain the Manufacturing Documentation to be true and accurate, and shall keep the Manufacturing Documentation in strict confidence and shall not use the Manufacturing Documentation for any purposes other than providing or performing the Services or other obligations hereunder. SBL shall maintain all Manufacturing Documentation for at least that period specified in the applicable QAA. Upon written request of Client and at mutually agreeable times, Client shall have the right to review [*] Manufacturing Documentation, including the executed Batch Records [*] as further defined in the applicable QAA. Client may also [*] copies of such Manufacturing Documentation, [*]. SBL shall record and maintain such records, data, documentation and other information in the language required in the applicable QAA or as so required by a Regulatory Authority and in compliance with Applicable Laws. To the extent necessary, SBL may redact or withhold Manufacturing Documentation provided pursuant this MSA or any applicable PSA solely to the extent necessary to protect the confidential information of its other clients or third parties. The form and style of Batch documents, including, but not limited to, Batch production records, lot packaging records, equipment set up control, operating parameters, and data printouts, raw material data, and laboratory notebooks are the exclusive property of SBL. Notwithstanding anything to the contrary, SBL SOPs not specific to the Client's Products may be provided to Client for on-site review and/or through electronic data room if deemed reasonably necessary by both SBL and Client. Such SOPs cannot be removed from the SBL premises, copied, photographed or otherwise replicated.

4.7 **Use of Proprietary or Confidential Information.** SBL shall not use any SBL or third party (other than Client) proprietary or confidential information, or any proprietary process (whether that of SBL or any third party, but not including any proprietary or confidential information or process provided by Client for such use) in the manufacture of Product without the prior written consent of Client, which may be withheld in its sole discretion.

SECTION 5 -SERVICE DESCRIPTIONS

5.1 **Technology Transfer.**The Parties shall make their personnel available at the Facility to the extent reasonably necessary to enable their transfer and implementation activities in accordance with the PSA. Client shall transfer to SBL the Reference Standards, Client Technology, Client Materials, and Cell Line to SBL in accordance with the plan, timelines and quantities set forth in the PSA, which

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materials and technology shall be subject to the limited license set forth below in Sections 11.2 and 11.3. In the event that Client agrees to utilize [*] for Technology Transfer, Client agrees that (a) in the event of any relevant change that affects a Client user's authorization to use such portal, Client shall promptly notify SBL thereof so that SBL may disable such Client user's usernames and/or remove or change passwords in order to secure the [*] and (b) Client shall ensure that all of Client's users have up-to-date antivirus software installed on the computer devices used to access such portal.

5.1.1 As part of the Technology Transfer, Client and SBL will define in the Drug Substance and Drug Product PSAs, the specific in process and release tests to be performed by SBL. Client and SBL will also provide the necessary resources to support the transfer of the specified test methods to SBL, in accordance with the timelines established in the applicable PSA.

5.2 **Facility Modification and Equipment.** Except as otherwise specifically provided herein to the contrary, and upon mutual written agreement of the Parties, Client and SBL will agree on what equipment in the Facility is necessary to perform the Services, and, if the Parties deem it necessary, to procure additional equipment beyond that which is in the Facility as of the applicable PSA Effective Date. The Core Team shall determine [*]. Thereafter, if any additional equipment is necessary, such costs shall be dealt with by the Change provisions of this MSA. Except as provided in this MSA or any applicable PSA, the Facility, Warehouse and all the equipment shall be maintained, tested, validated, calibrated and qualified for their intended use by SBL [*].

5.3 **Raw Materials.**

5.3.1 **Management**. SBL shall procure and maintain a reasonable quantity of the Raw Materials required for the Services in accordance with the MSA and any applicable PSA. [*], the Core Team shall finalize the categorization of the Raw Materials into (i) Critical Raw Materials, (ii) Customized or Dedicated Raw Materials, and (iii) Other Raw Materials, or such other categorizations as are appropriate, and send the categorization to Client for approval as soon as practicable after the Effective Date. The Parties shall discuss and approve the categorization in accordance with this MSA and any applicable PSA no later than [*] after the receipt of such categorization from SBL. [*]. The list of Raw Materials may be amended from time to time, subject to the Parties' mutual agreement; [*]. During Technology Transfer, the Core Team shall agree on estimates for Raw Materials anticipated to be consumed in the Manufacture of each Batch. [*].

5.3.2 **Raw Material Strategy**. Client and SBL shall agree to strategies regarding Raw Material safety stock and sourcing from qualified vendors, provided that such strategies shall be reasonable under industry standard and given the nature of the particular Raw Material and its use in the Manufacture Process. Such strategies would be reviewed and agreed in the JSC. [*].

5.3.3 **Raw Material Specifications**. Client and SBL shall agree in writing on the Specifications for the Raw Materials, including without limitation analytical methods, supplier information including supplier site information, and other information concerning the stability, storage, and

safety thereof that are required for the Manufacturing of the applicable Product hereunder, as further described in the applicable QAA.

5.3.4 **Testing and Evaluation**. SBL or vendors qualified by SBL and approved by Client shall perform all testing and evaluation of the Raw Materials as required by the Specifications for the Raw Materials and the cGMPs, as further described in the applicable QAA, if applicable.

5.3.5 **Storage.** SBL shall secure sufficient and suitable cGMP storage for the Raw Materials; provided that such storage requirements shall be consistent with customary standards within SBL's industry. SBL shall exercise [*] to preserve and protect the Raw Materials [*], [*]. [*] (to the extent purchased in accordance with such PSA and this MSA, and in reliance on a Purchase Order, Firm Period, or Binding Year) [*].

5.3.6 **Service Fee Related to Raw Material.** Critical Raw Materials and Customized or Dedicated Raw Materials [*] as further detailed in the applicable PSA, and charged [*] in accordance with Sections 9.1(ii) and 9.2.2, subject to any Changes in the scope of work.

5.4 Client Materials.

5.4.1 **Management.** Client shall provide, either by itself or through its third party supplier, to SBL free of charge, Client Materials in amounts reasonably necessary to carry out the Services as agreed by the Parties in the applicable PSA. SBL shall make [*] to import the Client Materials to the Republic of Korea in a timely manner, provided that Client provides reasonable assistance. [*] Delivery conditions for the Client Materials shall be [*] (INCOTERMS 2010), provided further that the title to such Client Materials shall remain at all times with the Client. [*]. During Technology Transfer, the Core Team shall agree on estimates for Client Material anticipated to be consumed in the Manufacture of each Batch. [*]. Both Parties shall agree to joint strategies regarding Client Material safety stock and sourcing from qualified vendors, provided that the strategies shall be reasonable under the industry standard and given the nature of the particular Client Material and its use in the Manufacture Process. [*]. **[**[*].

5.4.2 **Client Materials Specifications.** Client shall provide SBL with the Specifications for the Client Materials, including without limitation analytical methods, supplier information, and other information concerning the stability, storage, and safety thereof that are required for the Manufacturing hereunder, as further described in the applicable QAA.

5.4.3 **Testing and Evaluation.** SBL shall start to perform testing of the Client Materials in accordance with the applicable QAA and/or Client's instructions prior to the performance of the Manufacturing hereunder, in order to determine whether such Client Materials meet the Specifications described in the applicable QAA (if applicable) within [*]. SBL shall inform Client in writing of (a) [*] and (b) [*]: (i) within [*] after SBL's receipt of the Client Materials or (ii) if release testing of Client Materials is not performed until it is needed for Manufacture, within [*] after such release testing is completed; or (iii) as otherwise agreed in writing between

the Parties, provided that SBL shall conduct any testing in a time sufficient to address the procurement of replacement Client Materials, in the event replacement Client Materials need to be delivered to SBL, Client shall timely deliver (or have delivered) the replacement Client Materials to SBL's Facility, and SBL shall use best efforts to timely test such Client Materials so as to enable their use in the applicable manufacturing runs. If, prior to performing any Services on the Client Materials, SBL determines that such Client Materials are defective or damaged, SBL shall not perform the affected Service on such Client Materials; rather, SBL shall consult with Client to determine whether the Client Materials are in fact defective, and if so, SBL shall follow Client's written instructions regarding disposal or return of such Client Materials to Client, [*]. [*]. SBL shall perform the Service [*] after receiving replacement Client Materials.

5.4.4 **Storage.** SBL shall secure sufficient and suitable cGMP storage for the Client Materials; provided that such storage requirements shall be consistent with customary standards within SBL's industry. SBL shall exercise industry standard care and [*].

5.4.5 **Handling Fee Related to Client Material.** Handling fees relating to the Client Material will be charged to Client in accordance with Sections 9.1(iii) and 9.2.3.

5.5 **Forecasts.** For each Commercial Product, the Parties shall determine a mutually agreeable mechanism for forecasting quantities to be ordered, which shall be detailed in writing and incorporated into the applicable PSA. For Clinical Product, the Parties shall agree upon the number and schedule of Batches to be Manufactured by SBL in the applicable PSA. The Firm Period within each such forecast (which is binding on both Parties) will be set forth in the applicable PSA. In the event SBL is not able to utilize any capacity reserved to Manufacture Product [*].

5.5.1 Upon such notification, then the Parties will meet promptly at the JSC and to discuss in good faith potential options for resolution including, without limitation [*].

5.5.2 [*]:

(a) [*].
(b) [*].
(c) [*].
(d) [*].
(e) [*].
(f) [*].
(g) [*].

5.6 **Purchase Orders.** For each Clinical Product or Commercial Product, Client shall notify SBL in a binding purchase order specifying a specific amount of Product to be Manufactured (a "**Purchase Order**") in accordance with a procedure to be agreed upon in the applicable PSA. The terms and conditions of this MSA shall control over any conflicting terms and conditions stated in any Purchase Order, acceptance or other communication or documents submitted or issued relating to this MSA.

Any other document that conflicts with the terms and conditions of this MSA is hereby expressly rejected (unless the Parties mutually agree to the contrary in writing with respect to a particular instance).

5.7 **Product Purchase Commitment.** As further set forth in the applicable PSA, during the Term the Parties may agree that Client will purchase a minimum quantity of Batches of a certain Product in a given year on a [*] basis (a "**Product Purchase Commitment**").

5.8 **Non-Conforming Product.**

5.8.1 If, (a) during Manufacture of a Batch and prior to Acceptance, the QA unit specified in the QAA determines that a Batch is Non-Conforming Product, or any Product is determined by either Party to be Non-Conforming Product, SBL shall propose the earliest possible date or dates for the replacement Manufacture of the Batch, [*], if the Parties agree in writing on a date, Manufacture a replacement Batch and deliver to Client the quantity of the Product equivalent to the quantity of Non-Conforming Product that was to be delivered in the original Batch. Before SBL schedules Manufacture of a replacement Batch, the Parties shall confirm that SBL has, or will have, adequate Client Materials to Manufacture such replacement Batch. Except in the event of [*], the remedies contained in Section 5.8 of this MSA shall be [*] of Client regarding a Non-Conforming Product (provided that Client shall retain its rights to indemnification under Section 13) and any Non-Conforming Product from an individual Batch shall [*].

5.8.2 If the Product produced in a Batch is Non-Conforming, the Parties shall conduct a root cause analysis and impact assessment of the non-conformance under the terms of the QAA. If the Quality units of the Parties do not agree on the root cause or impact assessment, then the Heads of Quality from both Parties, in consultation with the JSC, shall discuss, and if the disagreement is not resolved, the Heads of Quality shall determine that the Parties shall retain a mutually agreed upon independent expert or laboratory to (a) conduct the necessary investigative testing in accordance with regulatory authority expectations and/or (b) perform a root cause analysis/product impact assessment prior to the final completion of the relevant non-conformance investigation report. The costs of the independent expert [*]. The Quality units from both Parties will be required to review and approve the final non-conformance investigation report.

5.8.3 This Section 5.8.3 sets forth responsibility between the Parties for the following costs in the event of a Non-Conforming Product: (1) the [*]; (2) SBL's costs to [*] plus applicable SBL [*]; (3) the [*]; and (4) [*] which amount is to be calculated based on the [*] as supported by reasonable documentary evidence [*]. SBL shall be responsible for the foregoing costs to the extent the Non-Conforming Product [*]. In the event of Non-Conforming Product and the payment for the Batch has already been made, SBL shall, [*] (i) replace the batch as provided for in Section 5.8.1, or (ii) where SBL is [*].To the extent the Non-Conforming Product is caused by Client's breach of its obligations under the MSA or applicable PSA, [*]. To the extent no root cause of the Non-Conforming Product is identified, [*]. [*].

5.8.4 In the event that any of the foregoing procedures results in a Batch being delivered in a different year than the year in which the original Batch was ordered for delivery by Client, the Service Fee for such replacement Batch shall be the Service Fee in effect in the Year in which such replacement Batch is actually delivered by SBL.

5.8.5 If during Manufacture of a Batch and prior to SBL's Release, the Core Team determines that all of a Batch is Non-Conforming Product ("**Batch Failure**"), all terms and conditions including remedies in Sections 5.8.1 to 5.8.3 shall apply to the Batch Failure *mutatis mutandis*.

5.8.6 In the case of an anticipated [*], SBL shall promptly inform Client in writing and provide Client with a reasonably detailed [*].

5.8.7 In any Commercial PSA, the Parties shall agree to a definition of [*]. In the case of an [*], SBL and Client shall meet and work together reasonably and in good faith to seek a prompt and commercially reasonable solution [*]. SBL shall use [*]. [*].

5.9 Storage, Packaging and Delivery.

5.9.1 Service Deliverables other than Products. Storage, packaging and delivery of the Service deliverables other than Products Manufactured, and the Products Manufactured hereunder, shall be made in accordance with the terms of this MSA, applicable PSA, applicable QAA and the Applicable Laws.

5.9.2 Products.

(a) **Release by SBL and Acceptance by Client.**

(i) SBL shall perform all testing in accordance with the Specifications for SBL's Release of the Product, and will, upon completion of the Manufacturing Process for any Batch: (1) as soon as reasonably possible, and in any case [*] as defined in the QAA, timely prepare, in accordance with the shipping details received from Client, the samples to be delivered to Client or its designated contract service provider to conduct testing specified in the PSA, and (2) within [*], will conduct SBLs Release Testing, review the Batch Records, and otherwise complete SBL's Release for the Product in accordance with the terms of the applicable QAA. For clarity, Client shall be responsible for the delivery and logistics of the samples of the Product and notify SBL in a timely manner of the shipping details. Concurrent with such SBL's Release, SBL shall deliver to Client a copy of the Manufacturing Documentation supporting SBL's Release of the Product for each Batch, [*] ("**Batch Related**

Documents"), including a Certificate of Analysis, in accordance with the applicable requirements of the QAA. [*].

(ii) **Acceptance of Product.** Subject to (a) [*] and (b) [*], as set forth herein or in the PSA and/or the QAA, Client will complete the Acceptance Procedure and determine the acceptability of such Product in accordance with the applicable QAA within [*] following SBL's Release except [*], and for (3) as mutually agreed by the Parties. As part of the Acceptance Procedures, Client will notify SBL of any issues, including questions, clarifications or corrections needed to the Batch Related Documents, and SBL shall promptly provide responses, and will work with Client to ensure that Batches are released in a timely manner. [*]. [*]. Upon completion of the Acceptance, Client will promptly notify SBL. Upon Client's Acceptance, SBL will have [*]. Subject to [*], if Client does not reject such Product within the periods described above, such Product will be deemed to have been Accepted by Client and SBL will have [*], and Client's right to indemnification under Section 13.

(iii) **Latent Defect.**After Client's Acceptance of the Product, if Client finds any defects of the Product which could not have been reasonably discovered [*] (**"Latent Defect"**), Client shall promptly give written notice of such claim to SBL within [*]. [*]. Notwithstanding anything to the contrary, such claim for Latent Defect must be made within [*].

(b) **Delivery.** The Product Manufactured hereunder shall be delivered to Client or its designee [*] (INCOTERMS 2010), unless otherwise agreed to in the applicable PSA. The title to Product hereunder shall be transferred from SBL to Client when the Product is delivered consistent with [*]. The Parties further agree as follows:

(i) After SBL's Release of the Product and [*], SBL shall propose to Client a delivery schedule of the Product, in order for the Parties to agree on it in writing in advance [*]. [*];

(ii) SBL shall not deliver the Product until it has been instructed to do so by Client in accordance with the applicable QAA. Client shall confirm specific delivery instructions with SBL prior to SBL's Release of such Product. Upon SBL's Release of such Product, SBL shall store the Product as described in Section 5.9.2(c) and Client shall compensate SBL for storage costs for the Product as set forth in the applicable PSA;

(iii) SBL shall provide Client with invoice, packing lists, and supporting export documents as specified by Client by separate delivery and shipment documentation instructions, together with each shipment of the Product (or such other deliverables); and

(iv) In cooperation with Client and subject to the delivery schedule agreed by the Parties, SBL shall adhere to the first-expire-first-out (FEFO) principle in shipping all released Product, unless otherwise agreed upon by the Parties.

(c) Storage, Packaging and Shipping Container.

(i) Pursuant to the terms of this MSA and any applicable PSA, SBL shall store the Products Manufactured hereunder under appropriate conditions as specified in the applicable PSA and QAA.

(ii) SBL shall store, package, label and prepare shipment of the Product according to the Specifications for such Product, the applicable QAA and the SOPs, and using storage and/or shipping containers determined in the applicable PSA.

(iii) [*], subject to the availability of space and storage conditions, SBL shall store the Product under the terms and storage conditions specified in the applicable PSA/QAA, and [*]. [*].

SECTION 6 CHANGES TO THE SPECIFICATIONS, ANALYTICAL METHODS, MANUFACTURING PROCESS, FACILITY OR EQUIPMENT

6.1 **Approval for Change.** SBL shall not make any change to the Manufacturing Process, the Services, or the Specifications (a "**Change**"), without the prior written consent of Client in accordance with the applicable QAA.

6.2 **Changes Required by cGMP, Regulatory Authorities or Requested by Client.** Except as otherwise expressly set forth to the contrary in the applicable QAA, in the event that cGMP, a Regulatory Authority, Applicable Laws, or any other regulatory or legal authority requires, or Client requests in writing, a Change, SBL shall accommodate such requirements or requests, subject to the following:

(a) Client shall promptly notify SBL in writing of the required and/or requested Change(s), and provide information necessary for SBL to evaluate the effect of such Change(s), and SBL shall promptly advise Client in writing as to any applicable (i) additional equipment required, modifications to the Facility or equipment, and/or additional equipment and the Facility qualification and validation requirements; (ii) Manufacturing Process development, transfer, scale-up, testing, qualification, or validation requirements; (iii) regulatory requirements pursuant to such Changes; (iv)

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changes to the Manufacturing scheduling and/or Product delivery schedule; and (v) other impacts on the Facility or SBL's ability to manufacture products (including the Products) in the Facility, if any, which may result from such Change(s). The notification and formal approval procedure of such Changes shall be in accordance with the applicable QAA (i.e., change control procedures) (if applicable). The Parties shall meet in a timely manner to identify and discuss such Changes as appropriate;

(b) Prior to implementation of any such Change(s), SBL shall provide Client with an estimated plan and budget of the reasonable and necessary costs that would be incurred by SBL as a result of the implementation of any such Change(s), including, but not limited to for (i) process and analytical development; (ii) equipment and/or the Facility modifications, qualification, validation, maintenance, and decommissioning/disposal; (iii) process and analytical validation; (iv) document revisions or changes, and any Facility, equipment, and system modifications or changes; (v) additional stability testing; and (vi) preparing submissions to Regulatory Authorities (collectively, the "**Implementation Plan and Budget**"). Following review and written approval by Client of such Implementation Plan and Budget, and subject to the Core Team's approval and agreement followed by the Parties' written agreement, SBL shall commence implementation of such Change(s);

(c) During any such implementation, SBL shall provide Client with regular updates on the progress of implementation. Subject to any timeframe imposed by Applicable Law, SBL shall exercise [*] to implement the Change according to the Implementation Plan and Budget's target completion date. SBL shall provide written notice to Client if SBL becomes aware of any cause which may create delay with the implementation of such Change(s). Following any such notice, both Parties shall discuss an amendment of Implementation Plan and Budget; and

(d) Upon the approval of the Implementation Plan and Budget for particular Change(s), both Parties shall negotiate in good faith to determine the reasonable allocation between the Parties of the costs incurred by SBL for the implementation of any such Change(s), in accordance with the Implementation Plan and Budget and the following principles:

(i) [*];

(ii) [*]; and

(iii) [*].

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SECTION 7 REGULATORY APPROVALS AND INSPECTIONS.

7.1 **Regulatory Approvals.** SBL shall provide reasonable assistance and cooperation in order for Client to obtain and maintain the Regulatory Approvals. The costs and fees associated with such assistance and cooperation, to the extent not detailed in the MSA or applicable PSA shall be mutually agreed in writing between the Parties. As specified in the applicable PSA, the Parties shall agree on which Regulatory Approvals are to be obtained.

7.2 **Regulatory Approvals for the Facility.** SBL shall obtain and maintain all Regulatory Approvals that are required to Manufacture and ship the Product at the Facility and perform the Services. For clarity, as between the Parties, Client shall obtain and hold all clinical trial applications and marketing approvals (and applications therefor) for the Product.

7.3 **Regulatory Inspections.** SBL shall facilitate on-site inspections of the Facility conducted by Regulatory Authorities. SBL shall notify Client according to the applicable QAA provisions of any contacts or inquiries by the Regulatory Authorities, including inspections, Pre-Approval Inspections, sample requests, and written correspondence and its result, related to the Product, as further defined in the applicable QAA. [*].

SECTION 8 QUALITY COMPLIANCE

8.1 **Quality Agreement**. Both Parties shall adhere to the provisions of the applicable QAA and the Parties agree that all elements of quality assurance, quality control and the like shall be governed by the terms and conditions of the applicable QAA. In the event of a conflict between the MSA and the applicable QAA, the MSA shall prevail over those of the applicable QAA with the exception of Product quality-related matters, cGMP and related regulatory requirements in which case, the terms of the applicable QAA shall prevail. The QAA for any Product is incorporated herein, and any material breach of the QAA may constitute a breach of this MSA

8.2 **Audit.** Upon Client's request, [*], SBL shall accept an audit of the Facility and, if necessary, the Warehouse, by Client or its designee and shall allow Client or its designee to inspect the Manufacture of the Product during provision of the Services and related records and documentation, and provide Client or its designee access to relevant personnel, solely to ascertain compliance by SBL with the terms of this MSA or any applicable PSA or QAA, provided, however, that in the event Client uses a designee, SBL shall not unreasonably withhold consent, provided, that SBL may reasonably withhold consent for a designee [*], and execute a separate confidentiality agreement with such designee and SBL as may be appropriate in the circumstances. [*]. [*]. Client will provide SBL with written notice [*] prior to any audit, and the Parties shall decide on a mutually agreeable date, duration, visitor list, and agenda prior to the audit. Notwithstanding the foregoing, if the audit is required for cause [*], the foregoing sentence shall not apply [*]. While at the Facility, all such Client personnel shall have reasonable access to all areas as are relevant to SBL's performance of the Services hereunder, provided that SBL may reasonably restrict Client personnel's access to the Facility as it deems necessary and visitors pursuant to this Section shall comply with all applicable

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SBL policies and procedures including but not limited to safety and cGMP, and shall be bound by confidentiality obligations consistent with Section 10.

8.3 **[*]**. For a Commercial Product or a [*], either Party shall notify the other Party as soon as practicably possible if any Commercial Product or a [*] is the subject of a potential, threatened or actual recall or withdrawal (a "**Recall**" or "**Withdrawal**") which may be attributable to any Service or Manufacture by or on behalf of SBL hereunder. Client shall be responsible for conducting all Recalls/Withdrawals and shall make all decisions regarding, and in all events shall have sole authority for, conducting any Recalls, Withdrawals or corrections with respect to the Product and SBL shall at all times exercise [*] to provide its assistance and cooperation to Client in conducting such Recalls/Withdrawals to the extent the Recall/Withdrawal arises out of SBL's Manufacture of Product. Details regarding the roles and responsibilities of the Parties in regard to Recalls/Withdrawals are set forth in the applicable QAA. If such Recall/Withdrawal results solely from SBL Assignable Error, SBL shall be responsible for [*]. [*].

8.4 For the purpose of this Section, Recall/Withdrawal expenses shall not include [*] (which shall be addressed pursuant to the provisions regarding replacement or refunding of costs in Section 8.3) [*]. If SBL and Client cannot agree which Party is at fault or whether a Recall/Withdrawal was reasonably beyond the control of the Parties, then an independent third party technical expert of international repute, acceptable to both Parties, shall be designated to make such determination. [*].

8.5 **Person-in Plant**. During the term of this MSA, for any PSA, Client shall have the right to have experienced (i) technical, and (ii) quality personnel of Client, who may be employees, contractors, or agents (each, a "**PIP**") as the Parties may reasonably determine necessary to be present at the Facility during any Manufacture and SBL's Release under this MSA, to the extent set forth below, for the purpose of observing Manufacturing and SBL's Release of the Product, participating in reviews, acting as liaison between Client and SBL with respect to Manufacturing Process related issues and performing such other actions set forth in the QAA. Client understands only [*] PIPs at any one time are allowed entry [*]. During Technology Transfer, Client shall have a right to have up to [*] people present at the Facility to facilitate the Technology Transfer process. Such PIPs shall be entitled to make decisions on quality and/or technical matters related to the Product. Client shall provide SBL reasonable notice of the timing and scope of the visits which shall, except in exceptional circumstances, be provided at least [*] prior to each visit in order to provide adequate time to schedule the required activities and resources, provided, that Client shall have the right to have such PIP present during any and all Manufacturing and/or release Services provided hereunder by SBL. SBL shall ensure that the PIP at the Facility is kept informed of the relevant issues which may affect the Product quality and will use the PIP to coordinate the performance of activities with respect thereto that are the responsibility of Client. [*]. Client shall bear its own costs with respect to the PIP's presence at the Facility, flight expenses, transportations, hotel accommodations, meals etc. While at the Facility, all such Client personnel shall have reasonable access to all areas as are relevant to SBL's performance of the Services hereunder, provided that SBL may reasonably restrict Client personnel's access to the Facility as it deems necessary to safeguard the information of third parties, and all such Client personnel shall agree to and comply with confidentiality obligations to third

parties, SBL policies and procedures related to safety, confidentiality, and cGMP, and all instructions of SBL employees at the Facility. Client shall remain responsible at all times for the compliance with the terms of this MSA and PSA by its employees and personnel.

8.6 **[*]**.

SECTION 9 CONSIDERATION AND PAYMENT TERMS

9.1 **Consideration**.In consideration for SBL's performing the Services and other obligations undertaken by SBL pursuant to this MSA or a PSA, Client shall pay SBL (i) amounts as set forth in the applicable PSA (the "**Service Fee**"); [*].

9.2 **Invoices.**

9.2.1 **Service Fee of the Project Stages and Batches.** Batches of Product shall be invoiced upon SBL's Release of a Batch of Product. Otherwise, Service Fees shall be invoiced according to the invoicing plan set forth in the applicable PSA. SBL's invoices pursuant to this MSA shall be electronic, unless otherwise agreed by the Parties in writing.

9.2.2 **Raw Materials.** With respect to the Raw Materials, [*]. The Parties shall collaborate in the selection of the vendors of the Raw Materials. All such vendors shall be approved in writing by Client before supplying SBL with Raw Materials for Product.

9.2.3 **Client Materials.** With respect to the Client Materials, which shall be supplied by Client to SBL [*] during SBL's performance the Services [*], SBL shall submit an invoice to Client in an amount as set forth in Section 9.1 upon SBL's completion of such the applicable stage of the Services or upon SBL's Release of a Batch of Product, as applicable.

9.3 **Payment**.

9.3.1 **Mode of Payment; Foreign Exchange**. All payments to SBL due under the MSA or any applicable PSA shall be made in USD $ within [*] from the receipt of SBL's [*] invoice in USD $ by means of telegraphic transfer to the account with the bank designated by SBL in the foregoing invoice, provided however that payment for Manufactured Batches shall be made in accordance with Section 5.9.2(a)(i) and 5.9.2(ii). For the purpose of computing payment amounts incurred by SBL in a currency other than USD $, such currency shall be converted into USD $ using the basic exchange rate published by Bank of Korea (or its successor institution) on its website "**http://ecos.bok.or.kr**/" (or any other website that may be used by the Bank of Korea or its successor institution for publication of currency exchange rates) at the opening of business on such invoice date. [*].

9.3.2 **Taxes**. All prices and charges are exclusive of any applicable taxes, levies, imposts, duties and fees of whatever nature imposed by any law or regulations in any country in respect of the

Services, importation or exportation of Raw Materials, Client Materials, Batches, and Product, which shall be paid by Client. For the avoidance of doubt, the foregoing shall not include any taxes imposed on the income or profit of SBL and any withholding tax lawfully levied on any payment to be made by Client to SBL, each of which shall be solely borne by SBL. Client shall pay or reimburse SBL (to the extent actually incurred and paid by SBL) for all customs duties and taxes in connection with the purchase, sale, importation or exportation of any Raw Materials, Client Materials, Batches, or Product or the provision of Services, except to the extent such customs duties and taxes are recoverable by or refundable to SBL. SBL agrees to assist Client in claiming exemption under double taxation or similar agreement or treaty from time to time in force to obtain a refund of any customs duties, value added taxes, and other taxes payable by SBL.

9.3.3 **Price Adjustments**. The Service Fees as set forth in the applicable PSA shall be adjusted annually on January 1 of each year during the Term, effective immediately, by [*]. The relevant date for price adjustment under this Section shall be the issue date of SBL's invoice.

9.3.4 **Default Interest.** [*]. In the event there is an undisputed amount which is invoiced by SBL but not paid by Client for [*], such event shall be considered a material breach of the relevant PSA, subject to Section 15.2.1.

SECTION 10 CONFIDENTIALITY

10.1 **Confidential Information.** The Disclosing Party shall use reasonable efforts to indicate Confidential Information it discloses in writing, in electric file or format or in other tangible manner is confidential and, with respect to its Confidential Information disclosed orally, visually or in other intangible manner, to reduce it in writing or in electric file or format, identified as confidential and delivered to another Party within [*] after such oral or visual disclosure: provided, however, that, in each case of the foregoing, a failure to do so shall not constitute a breach of this MSA nor shall deny, negate or destroy the confidential nature thereof, and no such failure shall relieve the Receiving Party of its obligations hereunder with respect to such Confidential Information. For clarity, information that Receiving Party knows or has reason to know is confidential, trade secret or proprietary information of the Disclosing Party at the time of disclosure shall be deemed to be the Confidential Information of the Disclosing Party. Furthermore, the existence and terms of the MSA shall be deemed to be the Confidential Information of both Parties.

Notwithstanding the foregoing, Confidential Information shall not include the information, which the Receiving Party can evidence by written records:

(a) was at the time of disclosure by the Disclosing Party or generation hereunder publicly known or available;

(b) after disclosure by the Disclosing Party or generation hereunder, became publicly known or available by publication or otherwise, other than by an authorized act or omission by the Receiving Party;

(c) was in the possession of the Receiving Party without confidentiality restriction at the time of the disclosure by the Disclosing Party or generation hereunder;

(d) was lawfully received from any third party having the lawful right to make such disclosure, without obligation of confidentiality; or

(e) was independently developed by or on behalf of the Receiving Party without reference to or use of the Disclosing Party's Confidential Information, as demonstrated by records contemporaneous with such development.

10.2 **Confidentiality.**The Receiving Party recognizes the proprietary and confidential nature of the Disclosing Party's Confidential Information and agrees that no right, title, ownership, license, or interest of any character in the Disclosing Party's Confidential Information other than as specifically granted herein, is conveyed or transferred to the Receiving Party. Each Receiving Party further agrees to maintain the Disclosing Party's Confidential Information in confidence, not to disclose or divulge the Disclosing Party's Confidential Information, in whole or in part, to any third party, and not to use the Disclosing Party's Confidential Information for any purpose other than performance of its obligations and exercise of its rights under this MSA and applicable PSA or QAA. Each Receiving Party shall guard such Confidential Information using the same degree of care as it normally uses to guard its own confidential or proprietary information of like importance, but in any event no less than reasonable care. The Receiving Party shall limit disclosure of the Disclosing Party's Confidential Information to its and those of its Affiliates' directors, officers, employees, consultants and agents ("**Representatives**") who have a need to know the Disclosing Party's Confidential Information for performance of the Services and implementation of this MSA and applicable PSA or QAA, provided that, the Receiving Party shall undertake procedures to ensure that each of its Representatives to whom the Disclosing Party's Confidential Information is disclosed (i) understands the confidential nature of the Disclosing Party's Confidential Information and (ii) that he or she is bound by obligations at least as restrictive as those contained herein with respect to the Disclosing Party's Confidential Information. The Receiving Party shall remain directly responsible for any failure by any of its Representatives to comply with this Section 10. SBL agrees not to reverse engineer any Confidential Information or Product of Client.

10.3 **Authorized Disclosures.** The Receiving Party may disclose the Disclosing Party's Confidential Information in the event that (a) the Disclosing Party's Confidential Information is reasonably required to obtain or maintain any Regulatory Approvals for the Products in any or all jurisdictions or (b) the Disclosing Party needs to disclose such Confidential Information to comply with Applicable Laws; provided that such Receiving Party shall give the Disclosing Party prior written notice of such requirement (to the extent permitted by Applicable Laws), shall exercise its Commercially Reasonable Efforts to limit disclosure of the Disclosing Party's Confidential Information to that which is necessary for compliance and shall otherwise maintain the confidentiality of the Confidential Information.

10.4 **Survival of Confidentiality Obligations.** The obligations of the Receiving Party under this Section 10 shall survive for a period of [*] of this MSA, except that such obligations with respect to any

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Confidential Information that is a trade secret will survive for so long as such information remains a trade secret.

10.5 **Return of the Confidential Information.** All written, printed or other tangible Confidential Information of the Disclosing Party, and all copies thereof shall be returned to the Disclosing Party by the Receiving Party (or destroyed at the Receiving Party's election, with such destruction certified in writing by an officer of the Disclosing Party) within [*] from the written request by the Disclosing Party. All Confidential Information disclosed electronically shall be completely deleted and destroyed by the Receiving Party within [*] from the receipt of the Disclosing Party's written request. Notwithstanding the foregoing, (i) digital backup files automatically generated by the Receiving Party's customary electronic data processing system may be retained and properly stored as confidential files for the sole purpose of backup and will be deleted in accordance with the Receiving Party's retention policy, and (ii) a single copy of the Confidential Information may be retained in the secured files of the Receiving Party for the sole purpose of determining the scope of obligations incurred by it under this MSA provided that the Receiving Party shall keep such Confidential Information in confidence, which Confidential Information shall remain subject to this Section 10.

SECTION 11 OWNERSHIP OF MATERIALS AND INTELLECTUAL PROPERTY; [*]

11.1 **Reference Standard, Client Technology, Client Materials, Cell Line, and Product.** SBL hereby understands and agrees that all rights to, titles of and interests in the Reference Standards, Client Technology, Client Materials, Product that has been Accepted, and Cell Line belong exclusively to Client, unless otherwise provided herein.

11.2 **Background Intellectual Property.** It is acknowledged that each Party owns or controls Background IP. Any Intellectual Property relating to the Reference Standards, Client Technology, Client Materials, Cell Line, and Product owned and/or controlled by Client as of the date of provision of such Reference Standards, Client Technology, Client Materials, Cell Line and Product by Client to SBL pursuant to Section 5.1, shall be deemed to be included in the Background IP of Client. Client hereby grants SBL a royalty-free, non-transferable, revocable, non-sublicensable, fully-paid-up right and license to use such Intellectual Property relating to such Reference Standards and Client Background IP during the Term for the sole purposes of Manufacturing of the Product or Services in accordance with this MSA and the applicable PSA. SBL shall not use any of the foregoing outside the scope of such limited license granted by Client to SBL.

11.3 **Inventions.** Any Intellectual Property arising out of or resulting from the Services performed under this MSA and any PSA, including but not limited to those contained in the Manufacturing Documentation, shall be hereinafter collectively called an "**Invention**".

11.3.1 **Client Invention.** Any Invention that [*] shall be a "**Client Invention**". SBL hereby assigns, and shall cause to be assigned, to Client all right, title and interest in and to all Client Inventions. SBL shall notify Client of such Client Invention(s) in writing immediately after SBL, the Project Management Team Leader, respective project personnel, SBL's or its

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Affiliate's or its Affiliate's employees or officers or other applicable third parties working for SBL hereunder makes, conceives or reduces to practice such Client Invention, and shall take all necessary measures so that Client would [*] Client Invention. Client may use any Client Invention for any purpose, including filing patent application and SBL shall provide reasonable cooperation to Client [*]. Client hereby grants SBL a royalty-free, non-transferable, revocable, non-sublicensable, fully-paid-up right and license to use any Client Inventions or other Intellectual Property generated under this MSA for the sole purposes of Manufacturing of the Product or Services in accordance with this MSA and the applicable PSA.

11.3.2 **SBL Invention.** Any Invention that is [*] (an "**SBL Invention**") shall be the sole property of SBL, and shall not be deemed to be Client Invention for the purposes of the MSA; provided, however, that SBL hereby grants to Client a worldwide, irrevocable, [*], royalty-free and fully-paid-up right and license under such Background IP of SBL and the SBL Invention to make, use, sell, offer to sell, export and import and otherwise exploit the Product(s), to the extent such SBL Background IP or SBL Invention is incorporated into the Product(s) or its manufacture.

11.4 **[*]**.

SECTION 12 WARRANTIES.

12.1 **The Parties' General Warranties.** Each Party warrants and represents that: (i) it has the corporate power and authority to enter into this MSA and has taken all necessary action on its part required to authorize the execution, delivery and performance of this MSA; (ii) it is aware of no legal, contractual or other restriction, limitation or condition that might adversely affect its ability to enter into this MSA and perform its obligations hereunder; (iii) it is duly organized, validly existing and in good standing under the laws of the jurisdiction in which it is incorporated; (iv) this MSA (a) has been duly executed and delivered by a duly authorized representative of it, and (b) is the legal, valid and binding obligation of it, enforceable against it in accordance with its terms, except as enforceability may be limited by applicable bankruptcy, insolvency, reorganization, moratorium or other similar laws now or hereafter in effect relating to or affecting creditors' rights generally; and (v) the execution, delivery and performance of this MSA by it does not and will not (a) violate any Applicable Laws applicable to it, or (b) violate or conflict with any provision of its Articles of Incorporation or By-laws or other organizational documents.

12.2 **Client's Warranties**. Client represents and warrants to SBL that as of the Effective Date and during the Term: (a) Client will comply with all Applicable Laws in connection with its performance under this MSA and applicable PSA, and that it will keep SBL informed of any information known to Client which would affect SBL's provision of the Services hereunder; (b) to the best of its knowledge, all Reference Standard, Client Technology, Client Materials, and Cell Line provided to SBL by or on behalf of Client will be suitable for the Manufacture of the Product; (c) to the best of its knowledge, as of the Effective Date of this MSA, SBL's use of the Client Materials, Manufacturing Process, and Client Technology for the purpose of the Services and in accordance with this MSA and the applicable PSA will not infringe any third party's Intellectual Property rights.

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12.3 **SBL's Warranties**. SBL represents and warrants that:

12.3.1 As of the Effective Date and during the Term, (i) SBL is the lawful owner, lessee, operator, or licensee of the Facility, and the equipment and machinery therein, (ii) SBL possesses all permissions and approvals required to enable SBL to perform its obligations under this MSA and the applicable PSA, and (ii) to the best of SBL's knowledge, none of the SBL Inventions or SBL Background IP infringes any third party Intellectual Property Right.

12.3.2 All Product Batches, at the time of delivery to Client's designated carrier, shall (a) conform to the Specifications [*]; (b) be Manufactured, packaged, handled and stored in compliance with the requirements of cGMP [*] and all Applicable Laws; (c) comply with the Standard Operating Procedures; (d) be Manufactured in compliance with this MSA and the applicable PSA and QAA; and (e) be transferred free and clear of any liens, claims or encumbrances of any kind.

12.3.3 Neither SBL nor any SBL employee who performs the Manufacturing Services under the MSA or applicable PSA is listed on the FDA Debarment List (Drug Product Applications) (link: https://www.fda.gov/inspections-compliance-enforcement-and-criminal-investigations/compliance-actions-and-activities/fda-debarment-list-drug-product-applications, which link may be updated from time to time) pursuant to 21 U.S.C. § 335a ("**Debarred**"), and, to SBL's knowledge, neither SBL nor any such SBL employee subject to any investigation that could result in SBL or such person becoming Debarred. SBL agrees to notify Client in writing immediately if (i) SBL or any employee, contractor or agent who is performing any work under this MSA or any PSA is Debarred, or (ii) SBL confirms that debarment investigations on SBL or any employee, contractor or agent performing any work under this MSA or PSA could reasonably result in such person becoming Debarred, and promptly remove such employee from performing the Services.

12.4 **No Other Warranties.** THE REPRESENTATIONS AND WARRANTIES CONTAINED IN THIS SECTION 12 ARE EXPRESSLY IN LIEU OF AND EXCLUDE, AND THE PARTIES HEREBY EXPRESSLY DISCLAIM AND NEGATE, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAWS, ALL OTHER REPRESENTATIONS AND WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED (ARISING BY OPERATION OF LAW OR OTHERWISE), INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, EVEN IF THAT PURPOSE IS KNOWN.

SECTION 13 INDEMNIFICATION

13.1 **Indemnification by SBL.** SBL shall defend, indemnify and hold harmless Client, its Affiliates, and their officers, directors, employees or agents from and against any Damages arising or resulting from any third party (which shall exclude Client Affiliates) claims to the extent such Damages arise out of or in connection with any claims, demands, or actions based upon (i) [*] Services under this MSA or the applicable PSA; (ii) a breach of SBL's warranties under Section 12; or (iii) any claims alleging that the Services (excluding use of Client's Background IP) infringe any Intellectual Property rights of a third party; except in each case to the extent that such Damages are caused by the causes as set

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forth in Section 13.2 for which Client is obliged to indemnify (or would be obligated to indemnify SBL but for the limitations of liability set forth herein or in any PSA, in accordance with the limitations on liability set forth in the PSA).

13.2 **Indemnification by Client.** Client shall defend, indemnify and hold harmless SBL, its Affiliates, and their officers, directors, employees or agents from and against any Damages arising or resulting from any third party (which shall exclude SBL Affiliates) claims to the extent such Damages arise out of or in connection with any claims, demands or actions based upon (i) [*] this MSA or the applicable PSA; (ii) a breach of Client's warranties under Section 12; or (iii) any claim alleging that any specific Client instructions to SBL that constitute an additional manufacturing activity beyond what is provided for in the Master Batch Record or use of Client's Background IP necessary for SBL's performance of the Services pursuant to the MSA or any PSA (including but not limited to use of the Client Materials and Client Technology in SBL's performance of the Services) infringes any third party's Intellectual Property rights; except in each case to the extent that such Damages are caused by the causes as set forth in Section 13.1 for which SBL is obliged to indemnify Client (or would be obligated to indemnify SBL but for the limitations of liability set forth herein or in any PSA, in accordance with the limitations on liability set forth in the PSA).

13.3 **Indemnification Procedure.** The foregoing indemnification by SBL or Client shall be conditioned upon the Party who intends to claim indemnification under Section 13.1 or 13.2 (the "**Indemnified Party**") (i) providing written notice to the other Party ("**Indemnifying Party**") within twenty (20) calendar days after the Indemnified Party has been given written notice of such third party claim, provided that absence or delay of such prior written notice will not relieve the Indemnifying Party of its obligation to indemnify except to the extent such absence or delay materially prejudices the Indemnifying Party's ability to defend the third party claim; (ii) permitting the Indemnifying Party, upon timely notice by the Indemnified Party, the opportunity to assume full control and responsibility (at the Indemnifying Party's cost and expense) for the investigation and defense of any such claim with counsel reasonably satisfactory to the Indemnified Party, provided, however, that the Indemnifying Party shall keep the Indemnified Party informed as to the progress of the defense of any such claim and that the Indemnified Party shall cooperate in such defense and shall make available all records, materials and witness reasonably requested by the Indemnifying Party in connection therewith; and (iii) not settling or compromising any such claim without the Indemnifying Party's prior written consent, with such consent not to be unreasonably denied, withheld or conditioned.

SECTION 14 DISCLAIMER OF CONSEQUENTIAL DAMAGES; LIMITATION OF LIABILITY

14.1 **Disclaimer of Consequential Damages.** EXCEPT PURSUANT TO A PARTY'S INDEMNIFICATION OBLIGATIONS UNDER SECTION 13.1(iii) or 13.2(iii), OR IN [*], NEITHER PARTY WILL BE LIABLE UNDER THIS MSA FOR ANY SPECIAL, PUNITIVE, EXEMPLARY, MULTIPLIED, CONSEQUENTIAL, INCIDENTAL OR OTHER INDIRECT DAMAGES OF ANY TYPE OR NATURE, WHETHER BASED IN CONTRACT, TORT, STRICT

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LIABILITY, NEGLIGENCE OR OTHERWISE, INCLUDING LOSS OF PROFITS OR REVENUES.

14.2 **Limitation of Liability.** Specific caps on Damages shall be set forth in the applicable PSA.

SECTION 15 TERM AND TERMINATION OF AGREEMENT

15.1 **Term.** This MSA will become effective as of the Effective Date and will be in effect for as long as a PSA is in effect, unless earlier terminated as set forth in Section 15.2 (the "**Term**"). Each PSA will have its own initial term as stated therein and shall [*], unless either Party gives written notice to the other Party of its intention to terminate such PSA [*] prior to the end of the then current PSA term.

Notwithstanding the foregoing, for the [*] Commercial Drug Substance PSA, the Initial Commercial Term shall be [*].

15.2 **Termination**. This MSA or a PSA may be earlier terminated as set forth in this Section 15.2.

15.2.1 **Material Breach**. A Party may terminate any MSA or any PSA for a material breach thereof by the other Party, as follows: The non-breaching Party shall give the breaching Party written notice specifying such breach. If the breaching Party: (a) fails to cure such breach within [*] after receipt of such written notice; or (b) cannot cure such material breach within the said [*] period, then fails to commence to cure such material breach within [*] of receiving such written notice and complete such cure within a mutually agreed upon timeline, then the non-breaching Party may terminate this MSA on ten [*] written notice after expiration of such period stated above. This MSA shall terminate if all then-effective PSAs are terminated, and all then-effective PSAs shall terminate if this MSA is terminated.

15.2.2 **Insolvency**. This MSA may be terminated by either Party upon written notice at any time during the Term if the other Party: (a) files in any court pursuant to any statute a petition in bankruptcy or insolvency or for reorganization or for an arrangement or for the appointment of a receiver or trustee of such Party, or of its assets; (b) proposes a written agreement of composition for extension of its debts; (c) is served with an involuntary petition against it, filed in any insolvency proceeding which is not dismissed within ninety (90) days; or (d) makes an assignment for the benefit of its creditors. The Party affected shall immediately notify the other Party in writing of the occurrence of any of the foregoing events.

15.2.3 **Force Majeure**. Either Party may terminate this MSA or a PSA if a Party is unable to perform its obligations pursuant to this MSA or such PSA in the event of a Force Majeure Event in accordance with Section 17.3.

15.2.4 **Other Termination**. The Parties may terminate a PSA as set forth in such PSA.

15.3 **Effect of Expiration or Termination**.

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15.3.1Payment of Amounts Due. Expiration or termination of this MSA or any PSA for any reason shall not exempt a Party from paying to the other Party any amounts owing to such Party at the time of such expiration or termination.

15.3.2Decommissioning. Upon expiration or termination of a PSA for any reason, SBL shall cease and refrain from performing the Services described in such PSA (including Manufacturing and supplying the Product thereunder) for Client unless otherwise provided in the following Sections 15.3.2(a) to 15.3.2(d), and both Parties shall pursue decommissioning activities as set forth hereunder. [*].

(a) Fully Manufactured Product.

(i) If Client terminates a PSA pursuant to Section 15.2.1 or 15.2.2, upon Client's written election to SBL, SBL shall (i) deliver already fully Manufactured and Accepted Product to Client in accordance with the terms and conditions of the MSA and applicable PSA or (ii) destroy such Product. [*].

(ii) If SBL terminates a PSA pursuant to Section 15.2.1, or 15.2.2, upon Client's election, SBL shall (i) deliver any then-existing fully Manufactured and properly released Product to Client in accordance with the terms and conditions of the MSA and applicable PSA, or (ii) destroy such Product. [*].

(iii) If either Party terminates a PSA pursuant to Section 15.2.3, both Parties shall negotiate in good faith a reasonable manner for the handling of the fully Manufactured Product and the allocation of costs and expenses between the Parties.

(iv) If a PSA expires or is terminated pursuant to Section 15.1, the provisions of (ii) above shall apply.

(b) Client Materials being used for the Services (Product in Process).

(i) If Client terminates a PSA pursuant to Section 15.2.1 or 15.2.2, upon Client's written election to SBL, SBL shall (i) continue to use the Client Materials being used for the Manufacturing hereunder (for the Product in process) and deliver the fully Manufactured and Accepted Product therefrom to Client in accordance with the terms and conditions of the MSA and applicable PSA, or (ii) deliver to Client or destroy such Product in process. [*].

(ii) If SBL terminates a PSA pursuant to Section 15.2.1 or 15.2.2, upon Client's written election, SBL shall (i) continue to use the Client Materials being used for the Manufacturing hereunder (for the Product in process) and deliver the

fully Manufactured and Accepted Product therefrom to Client in accordance with the terms and conditions of the MSA and applicable PSA, or (ii) destroy such Product in process. [*].

(iii) If either Party terminates a PSA pursuant to Section 15.2.3, both Parties shall negotiate in good faith a reasonable manner for the handling of Product in process the Client Materials being used for the Manufacturing hereunder (for the Product in process) and the allocation of costs and expenses between the Parties.

(iv) If a PSA expires or is terminated pursuant to Section 15.1, the provisions of (ii) above shall apply.

(c) **Client Materials, Cell Line, and Reference Standards.**Upon expiration or termination of a PSA, and upon Client's written election to SBL, SBL shall deliver to Client and/or destroy all remaining Client Materials (subject to Sections 15.3.2(a) and 15.3.2(b)), all remaining Cell Line vials, Reference Standards and other materials required for Manufacturing.

The costs and expenses for such activities shall be borne by the Parties as follows:

(i) If Client terminates the PSA pursuant to Section 15.2.1 or 15.2.2, SBL shall deliver or dispose in accordance with Client's written instructions, [*];

(ii) [*];

(iii) If either Party terminates the PSA pursuant to Section 15.2.3, both Parties shall negotiate in good faith a reasonable manner for all such costs and expenses for such activities; and

(iv) If a PSA expires or is terminated pursuant to Section 15.1, the provisions of (ii) above shall apply.

(d) **Raw Materials.**

(i) If Client terminates a PSA pursuant to Section 15.2.1 or 15.2.2, upon Client's written election to SBL, SBL shall, at Client's election (with respect to any portion of the Raw Materials) deliver the remaining Raw Materials to Client [*], or dispose of them. [*].

(ii) If SBL terminates a PSA pursuant to Section 15.2.1 or 15.2.2, SBL will deliver the remaining Raw Materials to Client or dispose of them at Client's election. [*]. [*].

(iii) If either Party terminates a PSA pursuant to Section 15.2.3, both Parties shall negotiate in good faith a reasonable manner for the handling of the Raw Materials and the allocation of costs and expenses between the Parties.

(iv) If a PSA expires or is terminated pursuant to Section 15.1, the provisions of (ii) shall apply.

(e) Outstanding Obligations Regarding Purchase of Product.

(i) If Client terminates a PSA pursuant to Section 15.2.1 or 15.2.2, Client shall [*].

(ii) If SBL terminates a PSA pursuant to Section 15.2.1 or 15.2.2, [*].

(iii) For all other cases of termination of a PSA, the Parties will discuss in good faith the extent to which Client and SBL will be released from such obligations.

(f) **Survival**. Any termination or expiration of this MSA or any PSA shall not affect any outstanding obligations due hereunder prior to such termination or expiration, nor shall it prejudice any other remedies that the Parties may have under this MSA or such PSA. For greater certainty, except as otherwise expressly provided, termination or expiration of this MSA, irrespective of the cause, shall not affect any rights or obligations which, from the context thereof, are intended to survive termination or expiration of this MSA, including but not limited to Sections 8.3, 8.4, 8.6, 9, 10, 11 (excluding the license granted to SBL under Section 11.2), 12, 13, 14, 15, 16, and 17.2.

SECTION 16 ARBITRATION

16.1 **Informal Discussions.** Except as otherwise provided herein, in the event of any dispute, controversy or claim arising out of or relating to this MSA or any PSA, or the rights or obligations of the Parties hereunder (a "**Dispute**"), the Parties shall first try to settle their differences amicably between themselves through the Core Team and then, if necessary, through the JSC. Thereafter, if the JSC cannot resolve such Dispute, either Party may initiate informal dispute resolution on the executive level by sending written notice of the Dispute to the other Party, and within [*], appropriate executive officers of the Parties shall meet for attempted resolution by good faith negotiations. If such representatives are unable to resolve promptly such Dispute within [*], either Party may initiate arbitration proceedings to resolve such Dispute in accordance with the provisions of this Article 16.

16.2 **Arbitration.** If the Parties do not fully settle a Dispute pursuant to Section 16.1, and a Party wishes to pursue the matter, each such Dispute shall be finally resolved by binding arbitration in accordance with the Commercial Arbitration Rules of the International Chamber of Commerce ("**ICC**"), and

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judgment on the arbitration award may be entered in any court having jurisdiction thereof to enforce the arbitration award. The arbitration shall be conducted by a panel of three persons, each of which shall be experienced in the pharmaceutical biologics manufacturing. Within [*] after initiation of arbitration, each Party shall select one person to act as arbitrator and the two Party-selected arbitrators shall select a third arbitrator within [*] of their appointment. If the arbitrators selected by the Parties are unable or fail to agree upon the third arbitrator, the third arbitrator shall be appointed by the ICC. The place of arbitration shall be New York, New York, United States and all proceedings and communications shall be in English. The award rendered by the arbitrators shall be final, binding and non-appealable, and judgment may be entered upon it in any court of competent jurisdiction. Either Party may apply to the arbitrators for interim injunctive relief until the arbitration award is rendered or the controversy is otherwise resolved. Either Party also may at any time, without waiving any remedy under this MSA, seek from any court having jurisdiction any injunctive or provisional relief to protect the rights or property of that Party pending the arbitration award. In all cases, any decision or determination by the arbitrators shall comply with Article 14. The Parties further agree that any payments made pursuant to this MSA or any PSA pending resolution of the dispute shall be refunded if an arbitrator or court determines that such payments are not due.

16.3 **Confidentiality.** Except to the extent necessary to confirm or enforce an award or as may be required by law or regulation, neither Party nor an arbitrator may disclose the existence, content, or results of an arbitration without the prior written consent of the other Party. In no event shall an arbitration be initiated after the date when commencement of a legal or equitable proceeding based on the dispute, controversy or claim would be barred by the applicable New York statute of limitations.

16.4 **Costs and Fees.** Each Party shall bear its own attorneys' fees, costs, and disbursements arising out of the arbitration, and shall pay an equal share of the fees and costs of the arbitrators. Absent the filing of an application to correct or vacate the arbitration award as permitted by Applicable Law, each Party shall fully perform and satisfy the arbitration award within [*].

SECTION 17 MISCELLANEOUS

17.1 **Notices.** Any notice required or permitted under the MSA shall be in writing with duly authorized signature and made to the following addresses or facsimile numbers:

If to Client:
FibroGen, Inc.
409 Illinois St.
San Francisco, CA 94158 USA
Attention: Vice President of Biologics Manufacturing
With copy to: Chief Legal Officer

If to SBL:
Samsung Biologics Co., Ltd.
[*]

Attention: Head of Corporate Business Planning
Facsimile: +82-32-455-3242
With copy to: SBL Legal & Compliance Team

Either Party may change its designated address and facsimile number by notice to the other Party in the manner provided in this Section 17.1.

Any notice shall be deemed to have been delivered on the date of delivery if delivered personally (of the first business day following such date, if such date is not a business day), or on the next business day of sending if sent by facsimile with receipt confirmed by the recipient, or on the fifth business day of posting if sent by registered or certified mail with return receipt requested and postage prepaid.

17.2 **Governing Law.** This MSA shall be construed and interpreted in accordance with the laws of State of New York, United States and all rights and remedies shall be governed by such laws without regard to principles of conflicts of law. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to the transactions contemplated by the MSA.

17.3 **Effect of Force Majeure Event**. Except as set forth in this Section 17.3, neither Party (the "**Affected Party**") shall be liable to the other Party (the "**Non-Affected Party**") for failure or delay to perform its obligation under the MSA or any applicable PSA when such failure or delay is due to riots, storms, fires, explosions, floods, earthquakes, war, embargoes, blockades, insurrections, an act of God or any other cause which is beyond the reasonable control of the Affected Party, including those affected upstream suppliers, that prevents the Affected Party from performing such obligations ("**Force Majeure Event**").

Each Party agrees to give the other Party prompt written notice of the occurrence of any Force Majeure Event, the nature thereof, and the extent to which the affected Party will be unable fully to perform its obligations under this MSA or any PSA. If a condition constituting Force Majeure Event [*], the Parties shall negotiate a mutually satisfactory solution to the problem, if practicable, including termination of this MSA and any then-effective PSAs upon [*], or the use of a third party to fulfill the obligations hereunder of the Party invoking Force Majeure Event, [*].

17.4 **Assignment**. Neither Party shall assign, in whole or in part, this MSA or any PSA without the prior written consent of the other Party, which may not be unreasonably withheld; provided, however, that without SBL's prior written consent, Client may assign this MSA and any then-effective PSAs in their entirety to an Affiliate or to a third party in connection with the sale or transfer (by whatever method) of all or substantially all of the business or assets of Client's business to which this MSA relates. In such case, such Affiliate or third party shall subscribe in writing to be bound to this MSA and applicable PSAs and Client shall remain liable to SBL, on a joint and several basis, for full performance of the assignee third party's obligations and covenants under this MSA if such assignee is an Affiliate. Client shall notify SBL in writing of any such sale or transfer within [*] of such sale. For clarity, in the event that any Party assigns this MSA as permitted under this Section 17.4, it shall

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be required to contemporaneously assign any and all PSAs which are then in effect together with this MSA.

17.5 **No Grant of License.** Nothing in this MSA shall affect, or grant any right to, patents, know-how or other Intellectual Property owned by either Party prior to the commencement of this MSA unless otherwise expressly provided in this MSA.

17.6 **Ethical Practices.** SBL and its employees, subcontractors, agents and other representatives have not performed and shall not perform any of the following acts, either directly or through a third party, in connection with this MSA:

(a) give or offer to give, or authorize the giving of, any property, services, payment, money, or anything else of benefit or value to an official, public servant or employee (each, an "**Official**") of any governmental authority, state functionary, or instrumentality, or of any public international organization, or of any agency or subdivision thereof, or to any political party or official thereof, or to any candidate for political office ("**Governmental, Public or Political Entity**"), or

(b) enter into any other transactions with any Official of a Governmental, Public or Political Entity, in each case, for the purpose of: (i) influencing or inducing any act or decision of the Official of a Governmental, Public or Political Entity in his or her official capacity, including an act or decision to fail to perform such Official's functions with such Governmental, Public or Political Entity, or use his or her influence with such Governmental, Public or Political Entity to affect or influence any act or decision thereof, or (ii) securing any improper advantage, pursuing any business opportunity or business interests, or obtaining unjust or preferential benefits.

(c) SBL shall: (i) conduct due diligence to ensure that SBL and its affiliates, employees, subcontractors, agents or other representatives who perform Services hereunder do not improperly give, or offer to give, any Official of a Governmental, Public or Political Entity any property, payment, money, or anything else of benefit or value and comply with the terms of this Section; and (ii) maintain accurate and honest record-keeping and effective internal controls, including records that would reveal, and controls that would prevent, unethical practices to confirm that SBL's performance of Services conforms to all Applicable Laws. [*].

(d) If SBL breaches any of the covenants set forth in this Section: (i) this MSA may be immediately terminated at Client's sole discretion; [*].

17.7 **No Right to Use Names.** Except as expressly provided herein, no right, expressed or implied, is granted by either Party to the other Party under this MSA to use in any manner the name of such Party or any other trade name, trade dress, symbol, logo or trademark of such Party in connection with the performance of this MSA, without the prior written consent of the other Party. For clarity, Client may identify SBL as providing Manufacturing services for the Products to applicable Regulatory Authorities as required, and to the extent required under U.S. securities or other

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applicable laws and regulations, and SBL may identify Client to the extent required in its filings with the Korea Stock Exchange, both with prior written notice to the other Party. Notwithstanding anything to the contrary, Client's name and Product name shall not be included in SBL's public disclosures required by the Korea Stock Exchange, unless otherwise agreed by the Parties.

17.8 **Independent Contractors**. The Parties hereto are independent contractors and nothing contained in the MSA shall be deemed or construed to create a partnership, joint venture, employment, franchise, agency or fiduciary relationship between the Parties.

17.9 **Integration**. This MSA constitutes the entire agreement between the Parties relating to the subject matter of the MSA and supersedes all previous oral and written communications between the Parties with respect to the subject matter of this MSA, including any conflicting provisions as set forth in the TTA.

17.10 **Amendment; Waiver**. Except as otherwise expressly provided herein, no alteration of or modification to this MSA or any PSA shall be effective unless made in writing and executed by an authorized representative of each Party. No course of dealing or failing of either Party to strictly enforce any term, right or condition of this MSA in any instance shall be construed as a general waiver or relinquishment of such term, right or condition. The observance of any provision of this MSA may be waived (either generally or any given instance and either retroactively or prospectively) only with the written consent of the Party granting such waiver, which shall only be effective as to the specific instance set forth in such waiver.

17.11 **Severability**. The Parties do not intend to violate any applicable law. However, if any sentence, paragraph, clause or combination of this MSA is in violation of any law or is found to be otherwise unenforceable, such sentence, paragraph, clause or combination of the same shall be deleted and the remainder of this MSA shall remain binding, provided that such deletion does not alter the basic purpose and structure of this MSA.

17.12 **Construction**. The Parties mutually acknowledge that they have participated in the negotiation and preparation of this MSA. Ambiguities, if any, in this MSA shall not be construed against any Party, irrespective of which Party may be deemed to have drafted this MSA or authorized the ambiguous provision.

17.13 **Interpretation**. The captions and headings to the MSA are for convenience only, and are to be of no force or effect in construing or interpreting any of the provisions of the MSA. Unless context otherwise clearly requires, whenever used in the MSA: (a) the words "include" or "including" shall be construed as incorporating, also, "but not limited to" or "without limitation"; (b) the words "hereof," "herein," "hereby" and derivative or similar words refer to the MSA; (c) the word "law" or "laws" means any applicable, legally binding statute, ordinance, resolution, regulation, code, guideline, rule, order, decree, judgment, injunction, mandate or other legally binding requirement of a governmental authority (including a court, tribunal, agency, legislative body or other instrumentality of any (i) government or country or territory, (ii) any state, province, county, city or

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other political subdivision thereof, or (iii) any supranational body); and (d) all references to the word "will" are interchangeable with the word "shall" and shall be understood to be imperative or mandatory in nature. All references to days, months, quarters or years are references to calendar days, calendar months, calendar quarters, or calendar years. Whenever any matter hereunder requires consent or approval, such consent or approval shall not be unreasonably withheld, conditioned or delayed.

17.14 **Counterparts**. This MSA may be executed in two or more counterparts, each of which will be deemed an original, but all of which together will constitute one and the same instrument. This MSA shall be effective upon full execution by portable document format (pdf), facsimile or original, and a pdf or facsimile signature shall be deemed to be and shall be as effective as an original signature.

[THE REMAINDER OF THIS PAGE LEFT BLANK INTENTIONALLY]

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IN WITNESS WHEREOF, the Parties have executed the MSA as of the last date of signature written below.

FIBROGEN, INC.

Signature:	/s/ Michael Martinelli
Name:	Michael Martinelli, Ph.D.
Title:	SVP, Technical Dev, Drug Development
Date:	05 November 2020

SAMSUNG BIOLOGICS CO., LTD.

Signature:	/s/ Tae Han Kim
Name:	Dr. Tae Han Kim
Title:	Representative Director and President
Date:	09 November 2020

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Exhibit 10.36

SAMSUNG BIOLOGICS CO., LTD.
PRODUCT SPECIFIC AGREEMENT – CLINICAL PRODUCT DRUG SUBSTANCE

WHEREAS, this Clinical Product Specific Agreement (this "**PSA**") is entered into as of the date of the last signature below, and made effective October 30, 2020 (the "**PSA Effective Date**") by and between FibroGen, Inc., a Delaware corporation having its principal place of business at 409 Illinois Street, San Francisco, California, USA 94158 ("**Client**") and Samsung Biologics Co., Ltd., a company with offices at [*] ("**SBL**"). Client and SBL are sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**".

WHEREAS, Client and SBL entered into a Master Services Agreement effective October 30, 2020 (the "**MSA**") and whereas pursuant to Section 2.1 of the MSA, the Parties wish to enter into this PSA whereby SBL will provide certain Services as detailed herein with respect to the Clinical Product specified below;

WHEREAS, understanding that Product manufactured under this PSA may be used for either clinical or commercial purposes, the rights and obligations of each Party related to ongoing commercial Manufacturing of the same Drug Substance will be specified in a Product Specific Agreement – Commercial Product Drug Substance (the "Commercial PSA"). Similar terms as those agreed upon in this PSA shall be incorporated into the Commercial PSA.

NOW, THEREFORE, the Parties agree as follows:

1. **Relationship to the MSA**. All capitalized terms not defined in this PSA will have the meanings given to them in the MSA. This PSA is hereby incorporated by reference into the MSA.

2. **Definitions**

   a. "Campaign" shall mean a series of Batches of the Product that are produced in sequence using the same manufacturing equipment (including but not limited to the same bioreactor) followed by validated cleaning of such equipment and purification suite, and for the purposes of counting the number of Product Batches in a Campaign in a given period, the start date of such Campaign shall be the determining factor. A Campaign will be deemed to end upon the completion of such cleaning.

   b. "PSA Term" is defined in Section 9.

   c. [*].

   d. "Year" means each one (1) year period that begins on January 1 and ends on December 31.

3. **General Information**.

   a. Product: [*].

   b. Product Specification: The Product Specification will be contained in mutually agreed upon cGMP documentation and/or the QAA.

   c. Cell Line: [*]

   d. Manufacturing Facility: [*].

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e. Shelf life of the Product for the purposes of Section 5.9.2(a)(iii) of the MSA is [*], which may be updated by Client and notified to SBL at the JSC.

4. **Raw Materials**.

a. **Client Materials**. Client Materials to be supplied by Client to SBL free of charge by itself or a third party designee.

i. List: See Exhibit A: Client Materials

ii. Timing of provision of Client Materials to SBL (target) : [*]

b. **Raw Materials**. The Parties shall finalize the categorization of Raw Materials to be used in performing the Services of this PSA into Critical Raw Materials, Customized or Dedicated Raw Materials, and Other Raw Materials, and shall attach such list to this PSA as Exhibit B. Raw Materials will be procured by SBL [*]. Handling Fees for all Raw Materials included (Critical Raw Materials, Customized or Dedicated Raw Materials, and Other Raw Materials) for the Product shall be [*].

5. **Technology Transfer, Manufacturing, and Supply Services**. SBL shall perform the Services as set forth in this Section 5.

a. **Services.**

i. SBL shall provide the Services as set forth in Exhibit D in accordance with this PSA and the MSA.

ii. Fees and invoicing.

1. [*].

2. [*].

b. **Service Fees**. [*]. Additional Service Fees and costs may be detailed in an amendment to this PSA pursuant to Section 17.10 of the MSA or in an Implementation Plan and Budget pursuant to Section 6.2(b) of the MSA.

c. **Product Purchase Commitment**.

i. Notwithstanding anything to the contrary, during [*](each a "Binding Year"), Client shall order from SBL on a [*], and SBL commits to manufacture, the number of Batches of Product set forth in the table below on the terms and conditions set forth herein and in the MSA (the "Product Purchase Commitment"). The Product Purchase Commitment [*]. [*]. For clarity, the timeline below is an estimate only, and may be subject to change upon mutual agreement of the Parties.

[*]	[*]
[*]	[*]

ii. Within [*], Client shall issue a binding Purchase Order for [*] for the [*].

iii.[*].

1. Upon such notification, then the Parties will meet promptly at the JSC and to discuss in good faith potential options for resolution including, without limitation [*].

2. [*]:

a. [*].

b. [*].

c. [*].

d. [*].

e. [*].

[*].

iv. [*].

d. **Batch Failure**. Pursuant to Section 5.8.3 of the MSA, the Parties shall be responsible for costs related to Batch Failure as follows:

i. To the extent the Batch Failure is caused by an SBL Assignable Error, SBL shall be responsible for (1) the [*] which amount is to be calculated based on the [*]; (2) SBL's costs to [*] plus applicable SBL [*] as described in this PSA; (3) [*] as described in this PSA; and (4) [*] which amount is to be calculated based on the [*] as supported by reasonable documentary evidence [*]. Any such cost responsibility shall be issued as a [*].

ii. To the extent the Batch Failure is caused by Client's breach of its obligations hereunder, [*]. If a Batch Failure is caused by [*].

iii. To the extent no root cause of the Batch Failure is identified, [*].

6. **Regulatory Filings**. Client's regulatory filings covered by this PSA are clinical trial applications (e.g., USA IND, EU CTA/IMPD, China CTA (which in the case of China, may require additional fees)) commercial marketing applications (e.g., US BLA, EU MAA), as well as other filings as required by local regulatory requirements (e.g., GMP applications, drug master files). SBL shall use Commercially Reasonable Efforts to support Client's submissions or applications to any new Regulatory Authority, provided Client has provided SBL with reasonable notice and the Parties agree on an Implementation Plan and Budget, and [*]. Details of the scope of SBL's Services in regards to Regulatory Approvals shall be detailed in Exhibit D.

7. **Storage**. Pursuant to Section 5.9 of the MSA, if Client does not direct SBL to prepare Manufactured Clinical Product to be picked up by Client or Client's designated carrier with a pick-up date within [*], SBL shall store the Clinical Product at the Warehouse for up to [*] depending on the available storage capacity and [*]. [*].

8. **Limitation of Liability**. In addition to the limitation of liability in Section 14.1 of the MSA for special, punitive, incidental, indirect or consequential damages, the Parties' liability under the PSA shall be as set forth in this Section 8. Except for (i) a Party's indemnification obligations under Section 13.1(iii) and 13.2(iii) of the MSA; (ii) the Client's payment obligations under Section 9.3 of the MSA; (iii) [*], or (iv) [*], a Party's maximum aggregate liability to compensate the other Party for all Damages under this PSA will be [*] in which the cause of such liability lies or exists (whether in contract, tort, strict liability, statute or otherwise), and [*]. [*].

9. **Term**. This PSA will commence as of the PSA Effective Date and will continue in full force and effect until all the Services stated under this PSA are completed ("PSA Term"), unless earlier terminated in accordance with the provisions of this PSA and/or Section 15 of the MSA.

10. **Method Transfer**. The Parties agree that, upon request by Client and with appropriate cooperation from Client, SBL will complete the transfer, and validation (if applicable), and to perform all IPC and release testing for Drug Substance, [*], and will use Commercially Reasonable Efforts to complete such activities as soon as reasonably possible, but in any event prior to the commencement of the PPQ batches.

[THE REMAINDER OF THIS PAGE LEFT BLANK INTENTIONALLY]

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The Parties have entered into this PSA as of the date of the last signature below by their respective duly authorized representatives.

SAMSUNG BIOLOGICS CO., LTD.		**FIBROGEN, INC.**	
By:	/s/ Tae Han Kim	By:	/s/ Michael Martinelli
Name:	Tae Han Kim	Name:	Michael Martinelli
Title:	Representative Director & President	Title:	SVP, Manufacturing
Date:	09 November 2020	Date:	05 November 2020

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Exhibit A: Client Materials

[*]

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Exhibit B: Categorization of Raw Materials

Categorization to be agreed by the Parties.

Exhibit C: Service Fees

[*]

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Exhibit D: Scope of Work

[*]

[*] = Certain confidential information contained in this document, marked by brackets, has been omitted because it is both (i) not material and (ii) would likely cause competitive harm to the company if publicly disclosed.

October 22, 2020

Mark Eisner, M.D., M.P.H.
[PRIVATE ADDRESS]

Dear Mark,

FibroGen, Inc. is pleased to offer you the position of Chief Medical Officer reporting to me. The effective date of your employment ("**Effective Date**") will be set, as mutually agreed upon in advance with FibroGen, Inc. ("**FibroGen**") and confirmed with Human Resources.

This offer of employment is made contingent upon successful completion of FibroGen's background check or upon completion of all required documentation that will be made available to you on the Effective Date. This includes verification of the information provided online and your employment application. If necessary, you will be contacted to resolve any discrepancies in the verification of information. Your employment hire date will be determined after the completion of the background check process and your signed acceptance of this offer.

The terms of this offer of employment are as follows:

1. Compensation. FibroGen will pay you a starting annual salary of $600,000, payable in semi-monthly installments on our regular paydays in accordance with FibroGen's standard payroll policies. Your salary will begin as of the Effective Date. The position is classified as exempt and therefore not eligible for overtime pay. The first and last payment by FibroGen to you will be adjusted, if necessary, to reflect a commencement or termination date other than the first or last working day of a pay period.

2. Signing Bonus. FibroGen will pay you a sign-on bonus in the amount of $1,500,000 (subject to applicable payroll taxes and withholdings) to be payable, contingent up on your continued employment with the Company, in three installments as follows:

    a. $500,000 on the first payroll date following the Effective Date of your employment
    b. $500,000 on March15, 2021
    c. $500,000 on August 2, 2021

3. Stock Options and Restricted Stock Units. You will be granted the following equity incentive grant(s) pursuant to the terms and conditions of the Equity Plan effective on the date of acceptance of this letter (the "**Equity Plan**"), as may be amended or modified from time to time:

    - a stock option to purchase 80,000 shares of FibroGen's Common Stock with an exercise price set at the fair market value on the date of grant ("**Stock Options**"); and
    - a grant of 35,000 restricted stock units relating to shares of FibroGen's Common Stock ("**RSUs**").

    The actual number of shares subject to the grant hereunder may be adjusted, if required, for events such as stock splits, stock dividends, etc. pursuant to the Equity Plan. The Stock Options and RSUs will vest according to the schedule set forth in the Equity Plan.

4. Bonus Plan. You will be eligible to participate in FibroGen's Incentive Compensation Plan (the "**Bonus Plan**") adopted by FibroGen for its employees on such terms as FibroGen's Board of Directors (the "Board") may determine in its discretion.

The target bonus for your level will be 50%. Under the terms of the Plan, both corporate and individual performance is assessed annually and subject to final approval by the Company's Board of Directors. Employees hired during the course of a year will have a pro-rated bonus provided they commence their employment on or before September 30th of a calendar year. To remain eligible, employees must maintain satisfactory performance and be in an active status on the day of payment. Payments are expected to occur no later than the 15th of March in the year following the performance cycle.

5. Change in Control and Severance Agreement. You will be eligible to enter into the form of Company's Change in Control and Severance Agreement approved by the Board that provides for certain severance benefits upon a termination following a Change in Control (as defined therein) and upon certain other terminations.

6. Benefits. During the term of your employment, you will be eligible to participate in FibroGen's benefits program, which may include FibroGen's standard vacation benefits and other employee benefits such as medical, vision and dental health insurance, covering employees and officers. These benefits may be modified or subject to change from time to time. A copy of FibroGen's current benefits summary has been provided to you.

7. Employment Eligibility. You will also be required to sign the Employment Eligibility Verification (Form I-9). (You will need to complete and return Section One of Form I-9 along with your signed offer letter). On your first day of employment, please bring the necessary original documents that establish your identity and employment eligibility to work in the United States. Acceptable documents are listed on the reverse side of Form I-9. Such documentation must be provided to us within three (3) business days of your date of hire, or our employment relationship with you may be terminated.

8. Proprietary Information. You will abide by FibroGen's strict company policy that prohibits any new employee from using or bringing with them from any prior employer any proprietary information, trade secrets, proprietary materials or processes of such former employers. Moreover, because FibroGen's proprietary information is extremely important, this offer of employment is expressly subject to your execution of the enclosed Confidential Information, Secrecy and Invention Agreement for Employees.

9. At Will Employment. You should be aware that your employment with FibroGen is for no specified period and constitutes "at-will" employment. As a result, both FibroGen and you are free to terminate the employment relationship at any time, for any reason or for no reason, and with or without advance notice. The changing needs of FibroGen could also result in changes to certain aspects of your employment, such as compensation, responsibilities, location, etc. These provisions expressly supersede any previous representations, oral or written. Your at-will employment cannot be modified or amended except by written agreement signed by both you and the Chief Executive Officer of FibroGen.

10. Arbitration. Any dispute or claim, including all contract, tort, discrimination, and statutory claims, arising under or relating to your employment or termination of your employment with FibroGen ("Arbitrable Claim(s)") shall be resolved by arbitration. "Arbitrable Claims" shall not include: (1) claims under applicable workers' compensation law, (2) unemployment insurance claims, and (3) any disputes or claims relating to or arising out of the misuse or misappropriation of trade secrets. You and FibroGen hereby waive any rights each may have to a jury trial in regard to Arbitrable Claims. Arbitration for Arbitrable Claims will be conducted by the American Arbitration Association ("AAA") in San Francisco (or other mutually agreed upon city) under the Employment Arbitration Rules and Mediation Procedures ("AAA Rules"). The AAA Rules are available at https://www.adr.org/sites/default/files/EmploymentRules_Web_0.pdf, or can be obtained by contacting the FibroGen Human Resources department or by calling AAA at 800-778-7879. FibroGen will pay the fees and costs of the arbitrator. The arbitrator shall have the same authority as a court to award equitable relief, damages, costs, and fees (excluding the costs and fees for the arbitrator) as provided by law for the particular claims asserted. The arbitrator shall also have exclusive authority to rule on his or her own jurisdiction,

including any objections with respect to the existence, scope, enforceability or validity of the arbitration agreement. Such arbitration shall be final and binding on the parties and shall be the exclusive remedy for Arbitrable Claims.

Unless otherwise notified by FibroGen, this offer of employment is effective for five business days from the date of this letter. However, if you have any questions regarding the above provisions including the arbitration provision, please do not hesitate to contact us.

In the event of conflict between the terms contained in this offer letter and any other document, the terms of this offer letter (including any amendment to this letter) shall control. FibroGen reserves the right to amend the terms contained in this offer letter from time to time.

We look forward to your joining our team at FibroGen.

Sincerely,

/s/ Enrique Conterno
Enrique Conterno
Chief Executive Officer

ACCEPTED AND AGREED TO this

24 Day of October, 2020

/s/ Mark Eisner
Mark Eisner, M.D., M.P.H.

December 1, 2020
Intended Start Date

Enclosures: Benefits Overview

Exhibit 21.1

List of Subsidiaries of FibroGen, Inc.

Subsidiaries	Incorporation
Beijing Falikang Pharmaceutical Co., Ltd.	China
FibroGen (China) Medical Technology Development Co., Ltd.	China
FibroGen China Anemia Holdings, Ltd.	Cayman Islands
FibroGen Europe Oy	Finland
FibroGen International (Cayman) Limited	Cayman Islands
FibroGen International (Hong Kong) Limited	Hong Kong
Skin Sciences, Inc.	Delaware, USA

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We hereby consent to the incorporation by reference in the Registration Statements on Form S-3 (No. 333-236844) and Form S-8 (No. 333-200348, No. 333-213816, No. 333-216369, and No. 333-233204) of FibroGen Inc. of our report dated March 1, 2021 relating to the financial statements and financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

San Jose, California
March 1, 2021

Exhibit 31.1

CERTIFICATION

I, Enrique Conterno, certify that;

1. I have reviewed this annual report on Form 10-K of FibroGen, Inc.;

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(s) 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 the 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(s) 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: March 1, 2021

/s/ Enrique Conterno

Enrique Conterno
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION

I, Pat Cotroneo, certify that;

1. I have reviewed this annual report on Form 10-K of FibroGen, Inc.;

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(s) 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 the 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(s) 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: March 1, 2021

/s/ Pat Cotroneo

Pat Cotroneo
Senior Vice President, Finance and Chief Financial Officer (Principal Financial Officer)

Exhibit 32.1

CERTIFICATION

Pursuant to the requirement set forth in Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350), Enrique Conterno, Chief Executive Officer of FibroGen, Inc. (the "Company"), and Pat Cotroneo, Chief Financial Officer of the Company, each hereby certifies that, to the best of his knowledge:

1. The Company's Annual Report on Form 10-K for the year ended December 31, 2020 (the "Annual Report"), to which this Certification is attached as Exhibit 32.1, fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act, and

2. The information contained in the Annual Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

In Witness Whereof, the undersigned have set their hands hereto as of the 1st day of March, 2021.

/s/ Enrique Conterno	/s/ Pat Cotroneo
Enrique Conterno	Pat Cotroneo
Chief Executive Officer	Senior Vice President, Finance and Chief Financial Officer

This certification accompanies the Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of FibroGen, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.