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

FORM 10-K

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

For the Fiscal Year Ended December 31, 2019

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 No. 001-33093

LIGAND PHARMACEUTICALS INCORPORATED
(Exact name of registrant as specified in its charter)

Delaware	**77-0160744**
(State or other jurisdiction of incorporation or organization)	**(IRS Employer Identification No.)**
3911 Sorrento Valley Boulevard, Suite 110	
San Diego	
CA	**92121**
(Address of Principal Executive Offices)	**(Zip Code)**

Registrant's telephone number, including area code: (858) 550-7500
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, par value $.001 per share	**LGND**	**The Nasdaq Global 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 Securities Exchange Act of 1934. 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 definition of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

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

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

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

The aggregate market value of the Registrant's voting and non-voting stock held by non-affiliates was approximately $ 1.8 billion based on the last sales price of the Registrant's Common Stock on the Nasdaq Global Market of the Nasdaq Stock Market LLC on June 28, 2019. For purposes of this calculation, shares of Common Stock held by directors, officers and 10% stockholders known to the Registrant have been deemed to be owned by affiliates which should not be construed to indicate that any such person possesses the power, direct or indirect, to direct or cause the direction of the management or policies of the Registrant or that such person is controlled by or under common control with the Registrant.

As of February 21, 2020, the Registrant had 16,505,197 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the Registrant's 2020 Annual Meeting of Stockholders to be filed with the Commission within 120 days of December 31, 2019 are incorporated by reference in Part III of this Annual Report on Form 10-K. With the exception of those portions that are specifically incorporated by reference in this Annual Report on Form 10-K, such Proxy Statement shall not be deemed filed as part of this Report or incorporated by reference herein.

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GLOSSARY OF TERMS AND ABBREVIATIONS

Abbreviation	Definition
2019 Notes	$245.0 million aggregate principal amount of convertible senior unsecured notes due 2019
2023 Notes	$750.0 million aggregate principal amount of convertible senior unsecured notes due 2023
AAALAC	Accreditation of Laboratory Animal Care International
Ab Initio	Ab Initio Biotherapeutics, Inc.
Abvivo	Abvivo, LLC
ACOVA	ACOVA, Inc.
ADHF	Acute decompensated heart failure
Aldeyra	Aldeyra Therapeutics, Inc.
Amended Interest Purchase Agreement	Amended and Restated Interest Purchase Agreement, dated May 31, 2017, between the Company and CorMatrix Cardiovascular, Inc.
Amgen	Amgen, Inc.
ANDA	Abbreviated New Drug Application
API	Active pharmaceutical ingredient
Aptevo	Aptevo Therapeutics
Arcus	Arcus Biosciences, Inc.
ASC	Accounting Standards Codification
ASCO	American Society of Clinical Oncology
ASCT	Autologous Stem Cell Transplantation
ASU	Accounting Standards Update
Aziyo	Aziyo Med, LLC
Baxter	Baxter International, Inc.
BeiGene	BeiGene Switzerland GmbH
BendaRx	BendaRx Corp.
Bexson Biomedical	Bexson Biomedical, Inc.
BMS	Bristol Myers Squibb
CStone	CStone Pharmaceuticals (Suzhou) Co., Ltd.
CASI	CASI Pharmaceuticals, Inc.
Cardioxyl	Cardioxyl Pharmaceuticals, Inc.
CI-AKI	Contrast-induced acute kidney injury
Code of Conduct	Code of Conduct and Ethics Policy
Coherus	Coherus Biosciences, Inc.
CoM	Composition of Matter
Company	Ligand Pharmaceuticals Incorporated, including subsidiaries
Convertible Note	Senior Convertible Promissory Note
COPD	Chronic obstructive pulmonary disease
Cormatrix	Cormatrix Cardiovascular, Inc.
Cormatrix Asset Sale	Asset sale from CorMatrix to Aziyo
Corvus	Corvus Pharmaceuticals, Inc.
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CRO	Contract Research Organization
Crystal	Crystal Bioscience, Inc.
Cumulus	Cumulus Oncology, Ltd.
CVR	Contingent value right
CyDex	CyDex Pharmaceuticals, Inc.

Daiichi Sankyo	Daiichi Sankyo Company, Ltd.
Dianomi	Dianomi Therapeutics, Inc.
DMF	Drug Master File
ESG	Environmental, Social and Governance
Eisai	Eisai Inc.
Eli Lilly	Eli Lilly and Company
ECM	Extracellular matrix
EPA	Environmental Protection Agency
ESPP	Employee Stock Purchase Plan, as amended and restated
EU	European Union
Exelixis	Exelixis, Inc.
FASB	Financial Accounting Standards Board
FDA	Food and Drug Administration
FSGS	Focal segmental glomerulosclerosis
GAAP	Generally accepted accounting principles in the United States
GBM	Glioblastoma
Genagon	Genagon Therapeutics AB
GCSF	Granulocyte-colony stimulating factor
GigaGen	GigaGen, Inc.
Gilead	Gilead Sciences, Inc.
GPCR	G-protein coupled receptor
GRA	Glucagon receptor antagonist
HanAll	HanAll Biopharma Co., Ltd.
Harbour	Harbour BioMed Shanghai Co., Ltd.
HBV	Hepatitis B Virus
HCC	Hepatocellular Carcinoma
Hikma	Hikma Pharmaceuticals PLC
HNO	Nitroxyl
Hovione	Hovione FarmCiencia, S.A.
Icagen	Icagen, Inc.
IPR&D	In-Process Research and Development
IRAK4	Interleukin-1 Receptor Associated Kinase-4
IRS	Internal Revenue Service
IV	Intravenous
iMBP	iMetabolic Biopharma Corporation
Immunovant	Immunovant Sciences GmbH
IND	Investigational New Drug
Kira Pharma	Kira Pharmaceuticals Ltd.
KSQ Therapeutics	KSQ Therapeutics, Inc.
Ligand	Ligand Pharmaceuticals Incorporated, including subsidiaries
LTP	Liver targeting prodrug
Lundbeck	Lundbeck A/S
Marinus	Marinus Pharmaceuticals, Inc.
MCM	Mineral Coated Microparticle
Melinta	Melinta Therapeutics, Inc.
Merck	Merck & Co., Inc.
Merrimack	Merrimack Pharmaceuticals, Inc.

Metabasis	Metabasis Therapeutics, Inc.
Metavant	Metavant Sciences Ltd.
Millennium	Millennium Pharmaceuticals, Inc.
MLA	Master License Agreement
MRSA	Methicillin-resistant Staphylococcus aureu
NASH	Non-alcoholic steatohepatitis
NDA	New Drug Application
NOLs	Net Operating Losses
Novan	Novan, Inc.
Novartis	Novartis AG
Nucorion	Nucorion Pharmaceuticals, Inc.
OMT	Open Monoclonal Technology, Inc.
Ono	Ono Pharmaceutical Co., Ltd.
Opthea	Opthea Limited
Orange Book	Publication identifying drug products approved by the FDA based on safety and effectiveness
Original Interest Purchase Agreement	Interest Purchase Agreement, dated May 3, 2016, between the Company and CorMatrix Cardiovascular, Inc.
Palvella	Palvella Therapeutics, Inc.
Par	Par Pharmaceutical, Inc.
Pfizer	Pfizer, Inc.
PFS	Progression-free Survival
Pharmacopeia	Pharmacopeia, Inc.
Phoenix Tissue	Phoenix Tissue Repair
PhoreMost	PhoreMost Limited
PPD	Post-Partum Depression
PSU	Performance stock unit
R&D	Research and Development
Retrophin	Retrophin Inc.
Roivant	Roivant Sciences GMBH
RSU	Restricted stock unit
SAGE	Sage Therapeutics, Inc.
SARM	Selective Androgen Receptor Modulator
SEC	Securities and Exchange Commission
Sedor	Sedor Pharmaceuticals, Inc., or RODES, Inc.
Seelos	Seelos Therapeutics, Inc.
Selexis	Selexis, SA
Sermonix	Sermonix Pharmaceuticals, LLC
Spectrum	Spectrum Pharmaceuticals, Inc.
SQ Innovation	SQ Innovation, Inc.
Sunshine Lake Pharma	Sunshine Lake Pharma Co., Ltd.
Takeda	Takeda Pharmaceuticals Company Limited
Talem	Talem Therapeutics LLC
Tax Act	The Tax Cuts and Jobs Act
Teva	Teva Pharmaceuticals USA, Inc., Teva Pharmaceutical Industries Ltd. and Actavis, LLC
TG Therapeutics	TG Therapeutics, Inc.
TR-Beta	Thyroid hormone receptor beta
Valanbio	Valanbio Therapeutics, Inc.

VDP	Vernalis Design Platform
VentiRx	VentiRx Pharmaceuticals, Inc.
Vernalis	Vernalis plc
Verona	Verona Pharma plc
Viking	Viking Therapeutics
Vireo	Vireo Health
WuXi	WuXi Biologics Ireland Limited
WuXi Agreement	The Platform License Agreement, dated March 23, 2015, by and between Ligand and WuXi, as amended
Xi'an Xintong	Xi'an Xintong Medicine Research
X-ALD	X-linked adrenoleukodystrophy
xCella Biosciences	xCella Biosciences, Inc.
Zydus Cadila	Zydus Cadila Healthcare, Ltd

PART I

Cautionary Note Regarding Forward-Looking Statements:

You should read the following report together with the more detailed information regarding our company, our common stock and our financial statements and notes to those statements appearing elsewhere in this document.

This report contains forward-looking statements that involve a number of risks and uncertainties. Although our forward-looking statements reflect the good faith judgment of our management, these statements can only be based on facts and factors currently known by us. Consequently, these forward-looking statements are inherently subject to risks and uncertainties, and actual results and outcomes may differ materially from results and outcomes discussed in the forward-looking statements.

Forward-looking statements can be identified by the use of forward-looking words such as "believes," "expects," "may," "will," "plan," "intends," "estimates," "would," "continue," "seeks," "pro forma," or "anticipates," or other similar words (including their use in the negative), or by discussions of future matters such as those related to our future results of operations and financial position, royalties and milestones under license agreements, Capitsol material sales, product development, and product regulatory filings and approvals, and the timing thereof, as well as other statements that are not historical. You should be aware that the occurrence of any of the events discussed under the caption "Risk Factors" could negatively affect our results of operations and financial condition and the trading price of our stock.

The cautionary statements made in this report are intended to be applicable to all related forward-looking statements wherever they may appear in this report. We urge you not to place undue reliance on these forward-looking statements, which speak only as of the date of this report. Except as required by law, we assume no obligation to update our forward-looking statements, even if new information becomes available in the future. This caution is made under the safe harbor provisions of Section 21E of the Securities Exchange Act of 1934, as amended.

References to "Ligand Pharmaceuticals Incorporated," "Ligand," the "Company," "we," "our" and "us" include Ligand Pharmaceuticals Incorporated and our wholly-owned subsidiaries.

Partner Information

Information regarding partnered products and programs comes from information publicly released by our partners and licensees.

Trademarks

Our trademarks, trade names and service marks referenced herein include Ligand®, Captisol®, LTP™, LTP technology™, OmniAb®, OmniMouse®, OmniRat®, OmniFlic®, OmniClic™, OmniChicken® , Vernalis®, VDP™ and HepDirect™ which are protected under applicable intellectual property laws and are our property. All other trademarks, trade names and service marks including Kyprolis®, Evomela®, Zulresso™, Minnebro®, Baxdela®, Carnexiv™, Conbriza™, Duavee®, Promacta®, SUREtechnology Platform™, Viviant®, Vivitra™, Bryxta®, and Exemptia® are the property of their respective owners. Solely for convenience, trademarks, trade names and service marks referred to in this report may appear without the ®, ™ or ℠ symbols, but such references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or the right of the applicable licensor to such trademarks, trade names and service marks. Use or display by us of other parties' trademarks, trade dress or products is not intended to and does not imply a relationship with, or endorsement or sponsorship of, us by the trademark or trade dress owners.

Item 1. Business

Overview

We are a biopharmaceutical company focused on developing and acquiring technologies that help pharmaceutical companies discover and develop medicines. We employ research technologies such as antibody discovery technologies, structure-based drug design, formulation science and liver targeted pro-drug technologies to assist companies in their work toward securing prescription drug and biologic approvals. We currently have partnerships and license agreements with over 120 pharmaceutical and biotechnology companies. Over 200 different programs are in various stages of commercialization and development and fully funded by our collaboration partners and licensees. We have contributed novel research and technologies for approved medicines that treat cancer, osteoporosis, fungal infections and PPD, among others. Our collaboration partners and licensees have programs currently in clinical development targeting cancer, seizure, diabetes, cardiovascular disease, muscle wasting, liver disease, and kidney disease, among others. We have over 1,200 issued patents worldwide.

We have assembled our large portfolio of fully-funded programs either by licensing our own proprietary drug development programs, licensing our platform technologies such as Captisol or OmniAb to partners for use with their proprietary programs, or acquiring existing partnered programs from other companies. Fully-funded programs, which we refer to as "shots on goal," are those for which our partners pay all of the development and commercialization costs. For our internal programs, we generally plan to advance drug candidates through early-stage drug development or clinical proof-of-concept and then seek partners to continue development and potential commercialization.

Our business model creates value for stockholders by providing a diversified portfolio of biotech and pharmaceutical product revenue streams that are supported by an efficient and low corporate cost structure. Our goal is to offer investors an opportunity to participate in the promise of the biotech industry in a profitable, diversified and lower-risk business than a typical biotech company. Our business model is based on doing what we do best: drug discovery, early-stage drug development, product reformulation and partnering. We partner with other pharmaceutical companies to leverage what they do best (late-stage development, regulatory management and commercialization) to ultimately generate our revenue. We believe that focusing on discovery and early-stage drug development while benefiting from our partners' development and commercialization expertise will reduce our internal expenses and allow us to have a larger number of drug candidates progress to later stages of drug development.

Our revenue consists of three primary elements: royalties from commercialized products, sale of Captisol material, and revenue from license, milestone and other service payments. In addition to discovering and developing our own proprietary drugs, we selectively pursue acquisitions to bring in new assets, pipelines, and technologies to aid in generating additional potential new revenue streams.

2019 and Recent Major Business Highlights

Major Transactions and Strategic Investments

Consistent with our business model, we pursued novel investments to augment our technology platforms and assets. We acquired Ab Initio in a $12 million acquisition that brought Ligand a patented antigen technology that is synergistic with our OmniAb® therapeutic antibody discovery platform. We also invested $3 million in Dianomi in exchange for equity and a royalty rights on future development programs using Dianomi's patented Mineral Coated Microparticle (MCM) technology. In 2019, we sold our assets and royalty rights for Promacta to Royalty Pharma for $827 million.

On February 11, 2020, we announced the signing of an agreement to acquire the core assets, partnered programs and ion channel technology from Icagen for $15 million in cash. Icagen will also be entitled to receive up to an additional $25 million of cash payments based on certain revenue achievements. The transaction is subject to certain closing conditions, including a vote of Icagen stockholders, and is expected to close in April 2020.

Corporate and Governance Highlights

Ligand's Board of Directors is highly committed to policies and practices focused on environmental sustainability, positively impacting our social community and maintaining and cultivating good corporate governance. By focusing on such ESG policies and practices, we believe we can affect a meaningful and positive change in our community and maintain our open, collaborative corporate culture. We will continue our proactive shareholder and employee engagement in 2020. See www.ligand.com for information about our ESG policies and practices.

Sarah Boyce joined our Board, increasing the total number of Directors to nine. Also in 2019, two members of our Board, Nancy Gray and Sarah Boyce, were named to *WomenInc*'s *Most Influential Corporate Directors* list.

OmniAb Technology Platform Updates

We continue to invest in and expand the OmniAb Technology platform, and in 2019 we launched OmniClic™, a novel next-generation common light chain OmniChicken-based discovery technology focused on bispecific antibodies. We entered into nine new OmniAb platform license agreements in 2019 with Sanofi, Millennium/Takeda, GigaGen, Talem Therapeutics, Kira Pharma, Genagon, Ascella, Unity Biotechnology and Abvivo. Our scientists and our partners presented data highlighting the utility of the OmniAb platform at multiple conferences throughout the year, and we published multiple papers in peer-reviewed journals.

Development-stage OmniAb partners continue to report progress clinically; notable advancements include:

- CStone's CS1001, an OmniAb-derived anti-PD-L1 antibody, that demonstrated promising antitumor activity with a complete response rate of 33.3% in a Phase 2 trial in patients with relapsed or refractory extranodal natural killer/T-cell lymphoma. CStone also announced the start of a Phase 3 trial assessing CS1001 in combination with chemotherapy for treatment of gastric or gastro-esophageal cancers.
- Immunovant starting ASCEND-GO 2, a placebo-controlled Phase 2b trial evaluating OmniAb-derived IMVT-1401 in patients with Graves' ophthalmopathy. IMVT-1401 is a fully human antibody that selectively binds to and inhibits the neonatal Fc receptor.
- Aptevo Therapeutics announcing positive Phase 1 data for APVO436, and GenMab highlighting clinical progress of the OmniAb-derived DuoBody-PD-L1x4-1BB.

Captisol Technology Updates

We reported the highest level of annual Captisol material sales in 2019, and we entered into new Captisol clinical use or license and supply agreements with a number of new partners, including: Millennium/Takeda; Merck KGaA, reVision Therapeutics; SQ Innovation; BendaRx; Bexson Biomedical, Valanbio; and others.

Kyprolis® is an Amgen product that utilizes Captisol in its formulation. We earn royalties on global sales of Kyprolis and also receive revenue for material sales. In September 2019, Amgen announced that the Phase 3 CANDOR study met its primary endpoint of progression-free survival. The regimen resulted in a 37% reduction in the risk of progression or death in patients with relapsed or refractory multiple myeloma. In October 2019, Amgen announced a strategic collaboration with BeiGene, an oncology-focused biotechnology company with an established infrastructure in China, to expand its oncology presence in the region. Kyprolis is currently under regulatory review in China for relapsed and refractory multiple myeloma.

New Captisol-enabled products were launched or expanded into new geographies in 2019, with SAGE launching ZULRESSO™ for the treatment of postpartum depression in the US, and CASI launching Evomela® in China.

Gilead Sciences announced on January 31, 2020 that they are working closely with global health authorities to respond to the novel coronavirus (COVID-19) outbreak through the appropriate experimental use of remdesivir (GS-5734). Remdesivir is formulated with Captisol. Gilead has initiated clinical trials together with Chinese authorities in patients who have been infected with COVID-19 to determine the safety and efficacy of remdesivir as a potential treatment for the virus. Remdesivir was also highlighted in The New England Journal of Medicine for treating the first case of COVID-19 in the United States. We have a non-exclusive supply agreement with Gilead, and our economics are built into Captisol material sales.

On February 20, 2020, we entered into a Captisol Use/Supply Agreement with China Resources Double-Crane Pharmaceuticals Co., Ltd, ("CR Double Crane"), pursuant to which we will supply Captisol to CR Double Crane for use in preclinical and clinical studies of remdesivir to treat the 2019 novel coronavirus, 2019-nCoV. We will receive revenues based on the amount of Captisol ordered by CR Double Crane.

Development-stage Captisol partners reported progress of programs in a variety of therapy areas, notably:

- Marinus announced positive results from a Phase 2 trial of ganaxolone in Refractory Status Epilepticus.
- Merck KGaA announced Phase 2 results for M6620, an ATR kinase inhibitor, demonstrating that addition of M6620 to gemcitabine extended PFS without added toxicity in patients with platinum-resistant cancer.
- Takeda announced results of a Phase 1 proof-of-concept study of Captisol-enabled TAK-925, a selective orexin type-2 receptor (OX2R) agonist, in individuals with narcolepsy type 1.
- SAGE announced plans for SAGE-689, a potential therapy for disorders associated with GABA hypofunction. SAGE expects to commence a Phase 1 trial in 2020.

Vernalis Design Platform (VDP) Updates

We continued to expand our portfolio of VDP-derived partnerships during 2019, following our 2018 acquisition of Vernalis and VDP partners continued to report on development progress.

- Verona Pharma announced positive data in a 4-week Phase 2b COPD trial with nebulized ensifentrine on top of tiotropium therapy. The primary endpoint was met at all doses, and ensifentrine produced clinically and statistically significant improvements in lung function. Verona intends to start Phase 3 in 2020.
- We entered a license agreement with Cumulus for VER250840, a novel, oral, Chk1 kinase inhibitor. We are eligible to receive more than $76 million of milestones and tiered royalties in the mid-to-high single digits.
- We entered into a VDP collaboration with PhoreMost and will share revenues with PhoreMost on any future licenses.

Additional Pipeline Developments

Our existing pipeline of partnered programs continued to advance, with multiple partners reporting on clinical and regulatory developments. Selected highlights include:

- Viking presented new results from a Phase 2 study of VK2809, its novel liver-selective thyroid hormone receptor beta agonist, in patients with non-alcoholic fatty liver disease and elevated low-density lipoprotein cholesterol, and also announced the start of a Phase 2b trial in patients with biopsy-confirmed NASH.
- Palvella announced that the Phase 3 pivotal portion of the seamless Phase 2/3 VALO study of PTX-022 for the treatment of patients with pachyonychia congenita had commenced.
- Retrophin announced new data from the Phase 2 DUET study, examining the impact of sparsentan on quality of life in patients with FSGS.
- Sermonix started a Phase 2 trial of lasofoxifene in breast cancer, and announced grant of Fast Track Designation.
- Sanofi presented positive Phase 3 data of sutimlimab in patients with cold agglutinin disease.
- Metavant informed Ligand that they no longer planned to initiate a proof-of-concept trial for RVT-1502 in Type 1 diabetes following requests from FDA for additional non-clinical studies. Metavant is evaluating its development plans for the program.
- Daiichi Sankyo announced the launch of MINNEBRO® (esaxerenone) tablets in Japan.

Select Partner Financing Events

Multiple partners completed financing events in 2019 to fund development of Ligand-partnered programs. Notably, CStone listed shares on the HKG and raised $266 million it is using to fund development of CS1001. Seelos completed a reverse merger and listed on Nasdaq. In conjunction with the transaction, Seelos generated gross proceeds of $18 million to fund its pipeline. And, Nucorion announced the closing of a $5 million Series B financing to support Phase development for its lead program, NCO-1010 for hepatitis B. NCO-1010 utilizes Ligand's LTP Platform™ technology. Guangdong Ji-Bao Pharmaceutical Company of Guangzhou, China invested $4 million and Ligand invested $1 million in the Nucorion Series B round.

Internal Pipeline Highlights

We continue to invest in internal R&D with the goal to secure valuable partnerships in the future. In 2019, we announced positive top-line results from a Phase 1 trial of our internal Captisol-enabled (CE) Iohexol program. The trial achieved the primary endpoint by demonstrating pharmacokinetic bioequivalence of CE-Iohexol injection and a reference Iohexol injection (OMNIPAQUE™) after IV administration in healthy adults. CE-Iohexol injection was well tolerated, and adverse events were in line with the known safety profile of OMNIPAQUE. We plan to submit an IND with the FDA and to initiate a Phase 2 study in the U.S. in 2020. We also progressed five internal antibody-related programs leveraging our OmniChicken technology that we initiated in mid-2018. The programs are focused on targets for which biology is known, centered in the oncology space.

Technologies

A variety of technology platforms that enable elements of drug discovery or development form the basis of our portfolio of fully-funded shots on goal. Platform technologies or individual drugs discovered by Ligand are related to a broad estate of intellectual property that includes over 1,200 patents issued worldwide.

OmniAb Technologies

Our OmniAb technology includes our OmniRat, OmniMouse, OmniFlic, OmniChicken and OmniClic technology platforms for use in discovering fully human antibodies. The OmniRat, OmniMouse, and OmniFlic platforms consist of genetically-engineered transgenic animals that produce a broadly diversified repertoire of antibodies and enable novel fully-human antibody drug discovery and development by our OmniAb partners. Fully-human OmniAb antibodies provide advantages to our partners in that fully-human antibodies have reduced immunogenicity, streamlined development timelines and costs, and accelerated novel antibody discovery. The OmniChicken and OmniClic platforms consist of genetically-engineered transgenic chickens which enable the generation of novel antibodies against targets that are not immunogenic in mammals like mice and rats. We acquired these technologies through the acquisition of OMT in January 2016 and Crystal in October 2017. As of December 31, 2019, we had entered into OmniAb platform license agreements with more than 40 collaboration partners, including 2 partners who have rights through our partnership with WuXi. Our OmniAb partners were working on approximately 180 active programs, of which 12 were in various stages of clinical trials as of December 31, 2019.

Captisol Technology

Captisol is our patented, uniquely-modified cyclodextrin that is specifically designed to maximize safety, while improving the solubility, stability and bioavailability of APIs. Captisol can enable faster and more efficient development paths for our partners, given its known regulatory acceptance. In addition to solid Captisol powder, we offer our partners access to cGMP manufactured aqueous Captisol concentrate. This product offering was established in 2017 to reduce cycle time and increase Captisol production capacity for large volume drug products. We maintain both Type IV and Type V DMFs with the FDA. These DMFs contain manufacturing and safety information relating to Captisol that our licensees can reference when developing Captisol-enabled drugs. We also have active DMFs in Japan, China and Canada. As of December 31, 2019, Captisol-enabled drugs were being marketed in more than 70 countries, and over 40 partners had Captisol-enabled drugs in development.

Vernalis Design Platform (VDP)

The VDP technology leverages our leadership in structure-guided drug discovery in which protein structure, drug fragment screening and modeling are integrated with medicinal chemistry to enable the rapid discovery of novel drugs. The VDP approach establishes structural information via x-ray crystallography and NMR methods and develops reliable assay systems to test biophysical, functional and cellular properties. The VDP has proven success with highly-challenging pharmaceutical targets and has generated a broad portfolio, with over 5,000 novel drug/target complexes determined and over 400 granted and pending patents. We acquired the VDP technology through our acquisition of Vernalis in October of 2018, and maintain state-of-the-art laboratories in Cambridge, UK. As of December 31, 2019, we have agreements with 10 partners for active research collaboration using VDP technology on a total of 17 active programs.

HepDirect/LTP Technology Platform

The HepDirect platform is a first generation liver-targeting prodrug technology designed to deliver certain phosphorus-containing drugs to the liver by using a proprietary chemical modification that renders an API biologically inactive until cleaved by a liver-specific enzyme. The HepDirect™ technology may improve the efficacy and/or safety of certain drugs and can be applied to marketed or new drug products to treat liver diseases or diseases caused by hemostasis imbalance of circulating molecules controlled by the liver.

Our LTP platform is a broad second generation liver-targeting prodrug technology that has an activation mechanism similar to HepDirect but with broader applications and many improved features. The proprietary chemical modifications can be used with many chemical classes of drugs in addition to phosphorus-containing compounds and have multiple chemistry strategies, designed to improve flexibility and success rates. In addition, the second generation technology eliminates the undesirable by-products released during activation of the first generation prodrugs. As of December 31, 2019, we had entered into HepDirect/LTP platform agreements with six partners, all of whom had active programs.

SUREtechnology Platform (owned by Selexis)

We acquired economic rights to various SURE*technology* Platform programs from Selexis. The SURE*technology* Platform, developed and owned by Selexis, is a novel technology that improves the way that cells are utilized in the development and manufacturing of recombinant proteins and drugs. As of December 31, 2019, we are entitled to certain economic rights to SUREtechnology Platform license agreements with 14 partners developing or having commercialized 23 programs.

Partners and Licensees

We currently have partnerships and license agreements with over 120 pharmaceutical and biotechnology companies. In addition to the table below, we also have more than 10 undisclosed partners and licensees.

Big Pharma	Ticker
AbbVie	ABBV
AstraZeneca	AZN
Baxter	BAX
Boehringer Ingelheim	Private
BMS	BMY
Daiichi Sankyo	DSKY
Eli Lilly	LLY
Eisai	4523
GSK	GSK
Janssen	JNJ
Merck	MRK
Merck KGaA	MRK.DE
Novartis	NVS
Ono	4528
Otsuka	4768
Pfizer	PFE
Sanofi	SNY
Takeda	4502

Specialty Pharma	Ticker
Acrotech	Private
Aytu Bioscience	AYTU
Aziyo	Private
Beloteca	Private
CASI	CASI
CorMatrix	Private
CTI Biopharma	CTIC
Cuda	Private
Ferring	Private
Gloria	2437
Lundbeck	LUN
Proximagen	Private
Sedor	Private
Sermonix	Private
Shire	SHPG
SQ Innovation	Private
Teijin	TINLF
Vireo Health	Private

Generics	Ticker
Alvogen	Private
BioCad	Private
Coherus	CHRS
Gedeon Richter	GEDSF
Hikma	HIK
Par	Private
Zydus Cadila	CADILAHC

Biotech	Ticker
ABBA	Private
ABL Bio	298380
Abvivo	Private
Aldeyra	ALDX
Amgen	AMGN
Arcus	RCUS
Asahi Kasei	3407
Ascella	Private
BendaRx	Private
Bexson Biomedical	Private
bluebird bio	BLUE
Cantex	Private
Celgene	CELG
Corvus	CRVS
CStone	2616.HK
Cumulus	Private
Curon	Private
CURx	Private
Aptevo	APVO
Electra	Private
Exelixis	EXEL
Five Prime	FRPX
F-Star	Private
Genmab	GEN
Genagon	Private
Genekey Biotech	Private
Glenmark	GLENMARK
GigaGen	Private
Gilead Sciences	GILD
HanAll	9420
Harbour	Private
IBC Generium	Private
iMetabolic	Private
Immunovant	IMVT
J-Pharma	Private
Kira	Private
KSQ	Private
Marinus	MRNS
MEI	MEIP
Melinta	MLNT
Menarini	Private
Meridian Labs	Private
Metavant	Private
Merrimack	MACK
Novan	NOVN
Novogen	NVGN
Nucorion	Private
Opthea	OPT
Outlook	OTLK
Palvella	Private
Phoenix Tissue	Private
Precision Biologics	Private
Retrophin	RTRX
Revision	Private
SAGE	SAGE
Seattle Genetics	SGEN
Seelos	SEEL
Servier	Private
Sunshine Lake	Private
Surface	SURF
Symphogen	Private
Talem	Private
Teneobio	Private
TG Therapeutics	TGTX
Tizona	Private
Unity	UBX
Valanbio	Private
Vaxxas	Private
Vega	Private
VenBio	Private
VentiRx	Private
Verona	VRNA
Vertex	VRTX
Viking	VKTX
Virtuoso	Private
xCella	Private
Xi'an Xintong	Private
XTL Bio	XTLB
WuXi	603259
Zhilkang Hongyi	Private

Commercial and Clinical Stage Partnered Portfolio

We have a large portfolio of current and future potential revenue-generating programs, including over 200 fully-funded by our partners. In addition to the table below, we also have more than 100 undisclosed preclinical programs.

Approved		
Partner Name	**Program**	**Therapeutic Area**
Acrotech/CASI	Evomela	Cancer
Alvogen	Voriconazole	Infectious Disease
Amgen/Ono	Kyprolis	Cancer
Aytu	Tuzistra	Infectious Disease
Aziyo	ECM portfolio	Medical device/Cardiology
Baxter	Nexterone	Cardiovascular
Biocad	Teberif	Inflammatory/Metabolic
Exelixis/Daiichi-Sankyo	Minnebro	Cardiovascular
Hikma	Voriconazole	Infectious Disease
Lundbeck	Carnexiv	Central Nervous System
Melinta	Baxdela	Infectious Disease
Menarini	Frovatriptan	Central Nervous System
Merck	Noxafil-IV	Infectious Disease
Par	Posaconazole	Infectious Disease
Pfizer	Viviant/Conbriza	Inflammatory/Metabolic
Pfizer	Duavee	Inflammatory/Metabolic
Pfizer	Vfend-IV	Infectious Disease
SAGE	Zulresso	Central Nervous System
Zydus Cadila	Vivitra	Cancer
Zydus Cadila	Bryxta/ZyBev	Cancer
Zydus Cadila	Exemptia	Inflammatory/Metabolic
Zydus Cadila	Vortuxi	Inflammatory/Metabolic

Phase 3/Pivotal or Regulatory Submission Stage		
Partner Name	**Program**	**Therapeutic Area**
Aldeyra	Reproxalap	Other/Undisclosed
Biocad	BCD-066	Blood Disorders
CStone	CS1001	Cancer
IBC Generium	GNR-008	Severe and Rare
Novan	SB206	Infectious Disease
Outlook Therapeutics	ONS-5010	Other/Undisclosed
Retrophin	Sparsentan	Severe and Rare
Sanofi	Sutimlimab	Blood Disorders
Sedor	CE-Fosphenytoin	Central Nervous System
Sunshine Lake	Vilazodone	Central Nervous System
Takeda	Pevonedistat	Cancer

Phase 2		
Partner Name	**Program**	**Therapeutic Area**
Cantex	CX-01	Cancer
Cardioxyl/BMS	BMS986231	Cardiovascular
CTI Biopharma	Tosedostat	Cancer
Eisai	FYCOMPA	Central Nervous System
Gilead	GS-5734	Infectious Disease
Gloria	GLS010	Cancer
Immunovant	IMVT-1401	Inflammatory/Metabolic
J-Pharma	JPH-203	Cancer
Marinus	Ganaxalone IV	Central Nervous System
Merck	M6620	Cancer
Metavant	RT-1502	Inflammatory/Metabolic
Novartis	KLM465	Blood disorders
Novartis	CE-Trametinib	Cancer
Novartis	ECF843	Inflammatory/Metabolic
Opthea	OPT-302	Other/Undisclosed
Palvella	PTX-022	Other/Undisclosed
Precision Biologics	NPC-1C	Cancer
Sedor	CE-Budesonide	Inflammatory/Metabolic
Seelos	Aplindore	Central Nervous System
Sermonix	Lasofoxifene	Cancer
VentiRx	VTX-2337	Cancer
Verona	Ensifentrine	Inflammatory/Metabolic
Viking	VK5211	Inflammatory/Metabolic
Viking	VK2809	Inflammatory/Metabolic
Viking	VK0214	Inflammatory/Metabolic
Viking	VK0612	Inflammatory/Metabolic
Xi'an Xintong	Pradefovir	Infectious Disease
XTL Bio	hCDR1	Severe and Rare

Phase 1		
Partner Name	**Program**	**Therapeutic Area**
Amgen	AMG-330	Cancer
Aptevo	APVO436	Cancer
Arcus	AB122	Cancer
Corvus	Cifordenant	Cancer
CSL	CSL-324	Cancer
Cuda	Cudafol	Central Nervous System
F-Star	FS-102	Cancer
Gedeon Richter	Bevacizumab	Cancer
Gedeon Richter	RGB-03	Inflammatory/Metabolic
Genekey Biotech	PCSK-9	Inflammatory/Metabolic

Genmab	Gen1046	Cancer
Gossamer Bio	PFK-158	Cancer
HanAll/Harbour	HL161	Inflammatory/Metabolic
Janssen	JNJ64007957	Cancer
Janssen	JNJ67371244	Cancer
MEI Pharma	ME-344	Cancer
Meridian	ML-061	Cancer
Novartis	MIK-665	Cancer
Novartis	BCL-201	Cancer
Phoenix Tissue	PTR-01	Other/Undisclosed
Proximagen	CXCR4	Cancer
Servier	S55746/S64315	Cancer
Symphogen	SYM022/SYM023	Cancer
Takeda	TAK-020	Inflammatory/Metabolic
Takeda	TAK-925	Severe and Rare
Teva	Anti-IL5	Central Nervous System
Vaxxas	Nanopatch	Infectious Disease
VentiRx Pharma	VTX-1463	Cancer
Xi'an Xintong	MB07133	Cancer

Selected Commercial Programs

We have multiple programs under license with other companies that have products that are already being commercialized. The following programs represent components of our current portfolio of revenue-generating assets and potential for near-term growth in royalty and other revenue. For information about the royalties owed to us for these programs, see “Royalties” later in this business section.

Promacta (Novartis)

In the first quarter of 2019, we sold our Promacta related intellectual property rights licensed to Novartis, including the royalty stream on worldwide net sales of Promacta to Royalty Pharma for $827.0 million in cash. See detail in “*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (2), Sale of Promacta License.*”

Prior to the sale, Promacta accounted for nearly 50% of total revenue. We are entitled to no future royalty revenue from Promacta.

Kyprolis (Amgen)

We supply Captisol to Amgen for use with Kyprolis (carfilzomib), and granted Amgen an exclusive product-specific license under our patent rights with respect to Captisol. Kyprolis is formulated with Ligand's Captisol technology and is approved in the United States for the following:

- In combination with dexamethasone or combination with lenalidomide plus dexamethasone for the treatment of patients with relapsed or refractory multiple myeloma who have received one to three lines of therapy.
- As a single agent for the treatment of patients with relapsed or refractory multiple myeloma who have received one or more lines of therapy.

Kyprolis is also approved in multiple countries outside the U.S. and Amgen continues to invest significantly in Kyprolis to further expand its label and geography. Amgen's obligation to pay royalties does not expire until four years after the expiration of the last-to-expire patent covering Captisol. Our patents and applications relating to the Captisol component of Kyprolis are not expected to expire until 2033.

Kyprolis (Amgen)	
< $250 million	1.5%
$250 to $500 million	2.0%
$500 to $750 million	2.5%
>$750 million	3.0%

Our agreement with Amgen may be terminated by either party in the event of material breach or bankruptcy, or unilaterally by Amgen with prior written notice, subject to certain surviving obligations. Absent early termination, the agreement will terminate upon expiration of the obligation to pay royalties. Under this agreement, we are entitled to receive revenue from clinical and commercial Captisol material sales and royalties on annual net sales of Kyprolis.

Evomela (Acrotech and CASI)

We supply Captisol to Acrotech Biopharma for sales of Evomela in the U.S. and to CASI Pharmaceuticals for sales of Evomela in China. Evomela received market approval by the China National Medical Products Administration (NMPA). It is the only approved and commercially available melphalan product in China. Evomela is a Captisol-enabled melphalan IV formulation which is approved by the FDA for use in two indications:

- A high-dose conditioning treatment prior to ASCT in patients with multiple myeloma.
- For the palliative treatment of patients with multiple myeloma for whom oral therapy is not appropriate.

Evomela has been granted Orphan Designation by the FDA for use as a high-dose conditioning regimen for patients with multiple myeloma undergoing ASCT. The Evomela formulation avoids the use of propylene glycol, which has been reported to cause renal and cardiac side-effects that limit the ability to deliver higher quantities of therapeutic compounds. The use of the Captisol technology to reformulate melphalan is anticipated to allow for longer administration durations and slower infusion rates, potentially enabling clinicians to safely achieve a higher dose intensity of pre-transplant chemotherapy.

Under the terms of the license agreement, Acrotech Biopharma has marketing rights worldwide excluding China and CASI Pharmaceuticals has rights to market in China. We are eligible to receive over $50 million in potential milestone payments under this agreement and royalties on global net sales of the Captisol-enabled melphalan product. Acrotech and CASI's obligation to pay royalties will expire at the end of the life of the relevant patents or when a competing product is launched, whichever is earlier, but in no event within ten years of the commercial launch. Our patents and applications relating to the Captisol component of melphalan are not expected to expire until 2033. As described herein, we have entered into a settlement agreement with Teva and Acrotech Biopharma (the holder of the NDA for Evomela) which will allow Teva to market a generic version of Evomela in the United States on June 1, 2026, or earlier under certain circumstances. Absent early termination, the agreement will terminate upon expiration of the obligation to pay royalties. The agreement may be terminated by either party for an uncured material breach or unilaterally by Acrotech and CASI by prior written notice.

Nexterone (Baxter)

We have a license agreement with Baxter, related to Baxter's Nexterone, a Captisol-enabled formulation of amiodarone, which is marketed in the United States and Canada. We supply Captisol to Baxter for use in accordance with the terms of the license agreement under a separate supply agreement. Under the terms of the license agreement we will continue to earn milestone payments, royalties, and revenue from Captisol material sales. We are entitled to earn royalties on sales of Nexterone through early 2033.

Zulresso (SAGE)

We have a license agreement with SAGE, related to SAGE's Zulresso, a Captisol-enabled formulation of brexanolone for the treatment of PPD. SAGE announced marketing approval on March 21, 2019 for Zulresso. Under the terms of the agreement, we receive royalties and revenue from Captisol material sales.

Noxafil-IV (Merck)

We have a supply agreement with Merck related to Merck's NOXAFIL-IV, a Captisol-enabled formulation of posaconazole for IV use. NOXAFIL-IV is marketed in the United States, EU and Canada. In January 2020, Merck received approval in Japan for NOXAFIL-IV. We receive our commercial compensation for this program through the sale of Captisol, and we do not receive a royalty on this program.

Baxdela IV (Melinta)

Melinta's Baxdela IV is a Captisol-enabled delafloxacin-IV that was approved for the treatment of acute bacterial skin and skin structure infections. Delafloxacin is a novel hospital-focused fluoroquinolone antibiotic with activity against a variety of disease-causing bacteria-gram-positives, gram-negatives, atypicals and anaerobes, including quinolone-resistant MRSA. Under the terms of the agreement, we may be entitled to regulatory milestones, as well as a royalty on future sales by Melinta, and revenue from Captisol material sales.

Duavee or Duavive (bazedoxifene/conjugated estrogens) and Viviant/Conbriza (Pfizer)

Pfizer is marketing bazedoxifene, a selective estrogen receptor modulator, under the brand names Viviant and Conbriza in various territories for the treatment of postmenopausal osteoporosis. Pfizer is responsible for the marketing of bazedoxifene, a synthetic drug specifically designed to reduce the risk of osteoporotic fractures while also protecting uterine tissue. Pfizer has combined bazedoxifene with the active ingredient in Premarin to create a combination therapy for the treatment of post-menopausal symptoms in women. Pfizer is marketing the combination treatment under the brand names Duavee and Duavive in various territories. Net royalties on annual net sales of Viviant/Conbriza and Duavee/Duavive are each payable to us through the life of the relevant patents or ten years from the first commercial sale, whichever is longer, on a country by country basis.

Aziyo Portfolio (Aziyo)

We receive a share of revenue from the currently marketed Aziyo portfolio of commercial pericardial repair and CanGaroo® Envelope ECM products. In addition, we have the potential to receive a share of revenue and potential milestones from the currently marketed CanGaroo® ECM Envelope for cardiac implantable electronic devices. Aziyo's products are medical devices that are designed to permit the development and regrowth of human tissue.

Exemptia, Vivitra, Zybev and Bryxta (Zydus Cadila)

Zydus Cadila's Exemptia (adalimumab biosimilar) is marketed in India for autoimmune diseases. Zydus Cadila uses the Selexis technology platform for Exemptia. We are entitled to earn royalties on sales by Zydus Cadila for ten years following the first commercial sale.

Zydus Cadila's Vivitra (trastuzumab biosimilar) is marketed in India for breast cancer. Zydus Cadila uses the Selexis technology platform for Vivitra. We are entitled to earn royalties on sales by Zydus Cadila for ten years following the first commercial sale.

Zydus Cadila's Bryxta and Zybev (bevacizumab biosimilar) is marketed in India for various indications. Zydus Cadila uses the Selexis technology platform for Bryxta and Zybev. We are entitled to earn royalties on sales by Zydus Cadila for ten years following the first commercial sale.

Minnebro (Exelixis)

Daiichi Sankyo announced on January 8, 2019 the receipt of marketing approval in Japan for MINNEBRO Tablets (esaxerenone) for the treatment of hypertension. Our partner, Exelixis, entered into a collaboration agreement with Daiichi Sankyo for the development of esaxerenone, a mineralocorticoid receptor antagonist. Under the terms of the agreement with Exelixis, we are entitled to receive a royalty on future sales.

Summary of Selected Development Stage Programs

We have multiple fully-funded partnered programs that are either in or nearing the regulatory approval process, or given the area of research or value of the license terms, we consider particularly noteworthy. We are eligible to receive milestone payments and royalties on these programs. This list does not include all of our partnered programs. For information about the royalties owed to Ligand for these programs, see "Royalties" later in this business section. In the case of Captisol-related programs, we are also eligible to receive revenue for the sale of Captisol material supply.

Sparsentan (Retrophin)

Our partner, Retrophin, is developing sparsentan for orphan indications of severe kidney diseases, and has initiated a global pivotal Phase 3 clinical trial to enable an NDA filing for sparsentan for the treatment of FSGS. Additionally, Retrophin initiated a global pivotal Phase 3 clinical trial evaluating the long-term nephroprotective potential of sparsentan for the treatment of IgA nephropathy, a rare, immune complex mediated chronic glomerular disease. Certain patient groups with severely compromised renal function, including those with FSGS and IgA nephropathy, exhibit extreme proteinuria resulting in progression to dialysis and a high mortality rate. Sparsentan, with its unique dual blockade of angiotensin and endothelin receptors, is expected to provide meaningful clinical benefits in mitigating proteinuria in indications where there are no approved therapies.

Under our license agreement with Retrophin, we may be entitled to receive potential milestones of over $70 million and net royalties on future worldwide sales by Retrophin. The royalty term is expected to be 10 years following the first commercial sale. Retrophin is responsible for all development costs related to the program.

TR-Beta - VK2809 and VK0214 (Viking)

Our partner, Viking, is developing VK2809, a novel selective TR-Beta agonist with potential in multiple indications, including hypercholesterolemia, dyslipidemia and NASH. Viking announced positive results from its Phase 2 trial for VK2809 in hypercholesterolemia and fatty liver disease. Viking has also been granted orphan drug status by the FDA for the development of VK0214 for treatment of X-ALD. Under the terms of the agreement with Viking, we may be entitled to up to $375 million of development, regulatory and commercial milestones and tiered royalties on potential future sales. Our TR Beta programs partnered with Viking are subject to CVR sharing and a portion of the cash received will be paid out to CVR holders.

TR-Beta - VK2809 and VK0214 (Viking)	
< $500 million	3.5%
$500 to $750 million	5.5%
>$750 million	7.5%

BMS-986231 (BMS)

Our partner, BMS, is conducting Phase 2 clinical trials for a Captisol-enabled second-generation prodrug that chemically breaks down to produce HNO and an inactive byproduct. HNO is thought to have a dual mode of action, by improving cardiac function and acting as a vasodilator for treating ADHF. Under the terms of the agreement, we may be entitled to development and regulatory milestones, revenue from Captisol material sales and royalties on potential future sales by BMS.

IMVT-1401/HL161 (Immunovant, HanAll and Harbour)

Our partner, HanAll has granted Immunovant an exclusive license for the development, manufacture and marketing of IMVT-1401 (HL161, an anti-FcRn antibody) for the treatment of pathogenic IgG-mediated autoimmune diseases in the U.S., Canada, Mexico, the EU, the United Kingdom, Switzerland, Latin America, the Middle East and North Africa. Immunovant is currently conducting a Phase 2 clinical trial in myasthenia gravis and other inflammatory diseases. Additionally, HanAll and Harbour BioMed, are collaborating to develop HL161 for similar treatment in China and Korea. HanAll retains the rights to HL161 in Korea and Harbour will control the marketing in China. As part of our agreement with HanAll, we are entitled to development and regulatory milestones and royalties on potential future sales from HanAll and sublicense revenues from Immunovant and Harbour based on amounts received by HanAll.

SARM - VK5211 (Viking)

Viking is also developing VK5211, a novel, potentially best-in-class SARM for patients recovering from hip-fracture. SARMs retain the beneficial properties of androgens without undesired side-effects of steroids or other less selective androgens. In the fourth quarter of 2017, Viking announced positive results from its Phase 2 trial in patients who suffered hip fracture. Under the terms of the agreement with Viking, we may be entitled to up to $270 million of development, regulatory and commercial milestones as well as tiered royalties on potential future sales.

SARM - VK5211 (Viking)	
< $500 million	7.25%
$500 to $750 million	8.25%
>$750 million	9.25%

PTX - 022 (Palvella)

We acquired the economic rights to PTX-022 from Palvella in December 2018. PTX-022 is a novel, topical formulation comprising high-strength rapamycin in development to treat pachyonychia congenita (PC). PC is a serious, chronically debilitating lifelong monogenic rare skin disease with no approved treatment. Palvella is continuing enrollment for a pivotal Phase 2/3 clinical trial for PC and is expected to have top line data in late 2020.

PTX - 022 (Palvella)	
< $50 million	5.00%
$50 to $100 million	7.50%
>$100 million	9.80%

Lasofoxifene (Sermonix)

Lasofoxifene is a selective estrogen receptor modulator for osteoporosis treatment and other diseases, discovered through the research collaboration between us and Pfizer.

Our partner, Sermonix has a license for the development of oral lasofoxifene for the United States and additional territories. Under the terms of the agreement, we are entitled to receive over $45 million in potential regulatory and commercial milestone payments as well as royalties on potential future net sales.

Pevonedistat - TAK-924 (Millennium/Takeda)

Our partner, Millennium/Takeda is currently conducting Phase 3 trials for the development of pevonedistat for the treatment of hematological malignancies and solid tumors. Pevonedistat is a Captisol-enabled Nedd8-Activating Enzyme Inhibitor. Under the terms of the clinical-stage agreement, we may be entitled to over $25 million in regulatory and development milestones from Millennium/Takeda, revenue from Captisol material sales, and royalties on potential future net sales.

Ensifentrine – RPL554 (Verona)

Our partner, Verona, is currently conducting a comprehensive Phase 2 clinical trial for the development of ensifentrine as a maintenance treatment of COPD with nebulized and inhaled formulations. Verona has also completed a positive Phase 2a study evaluating ensifentrine as a treatment for cystic fibrosis. Under the terms of our agreement with Verona, we are entitled to development and regulatory milestones, including a £5.0 million payment upon the first approval of any regulatory authority, and royalties on potential future sales.

JNJ64007957 (Janssen)

Our partner, Janssen, is developing JNJ64007957, a BCMAxCD3 bispecific antibody discovered in part with the OmniAb platform technology. Janssen is currently conducting two Phase 1 trials, as a single agent and in combination with daratumumab in multiple myeloma. We are entitled to earn development and regulatory milestones based on the development of JNJ64007957.

JNJ-67371244 (Janssen)

Janssen is also developing JNJ-67371244, an anti-CD33xCD3 antibody discovered in part with the OmniAb platform technology. Janssen is currently conducting a Phase I trial for cancer therapy. We are entitled to earn development and regulatory milestones based on the development of JNJ-67371244.

Ganaxalone IV (Marinus)

Our partner, Marinus, is conducting Phase 2 clinical trials with Captisol-enabled ganaxolone IV in patients with PPD and refractory status epilepticus. Marinus has exclusive worldwide rights to Captisol-enabled ganaxolone, a GABAA receptor modulator, for use in humans. We are entitled to development and regulatory milestones, revenue from Captisol material sales, and royalties on potential future sales.

APVO436 (Aptevo)

Our partner, Aptevo, is currently conducting a Phase 1 trial of APVO436 for the treatment of acute myeloid leukemia. There is a high unmet medical need for targeted immunotherapies such as APVO436, that can potentially treat patients with relapsed or refractory disease, or patients who cannot tolerate traditional chemotherapy. Under the terms of the agreement with Aptevo, we are entitled to development and regulatory milestones and royalties on potential future net sales.

Gen1046 (GenMab)

Our partner, GenMab, is currently conducting a Phase 1 trial of Gen1046 for use in patients with malignant solid tumors. Under the terms of the agreement with GenMab, we are entitled to clinical and regulatory milestones and royalties on potential future sales.

SYM022 and SYM023 (Symphogen)

Our partner, Symphogen, is currently conducting Phase 1 trials of SYM022 and SYM023 to determine if it is safe and tolerable for patients with locally advanced/unresectable or metastatic solid tumor malignancies or lymphomas that are refractory to available therapy for which no standard therapy is available. Under the terms of the agreement with Symphogen, we are entitled to sublicense revenues, milestones and royalties on potential future net sales.

WuXi Partnership

Pursuant to the WuXi Agreement, we have granted WuXi a non-exclusive license to use our OmniRat, OmniMouse and OmniFlic platforms solely to research, develop and make antibodies, and we have agreed to use commercially reasonable efforts to deliver to WuXi animals from such platforms to support WuXi's licensing rights under the WuXi Agreement. Further, WuXi has the right to out-license antibodies it discovers (whether for itself or at the direction of out-licensees) under the WuXi Agreement to out-licensees worldwide. We are entitled to royalties in the low single digits on net sales of products. Unless earlier terminated, the term of the WuXi Agreement shall continue indefinitely. Either party may terminate the WuXi Agreement upon specified notice of the other party's uncured material breach of the WuXi Agreement. In addition, we have the right to terminate the WuXi Agreement if WuXi or one of its out-licensees challenges the validity of one of our patents covering the platform and WuXi has the right to terminate the WuXi Agreement for convenience following a specified period after notice of termination.

In addition to other earlier stage programs, the following programs have been licensed pursuant to the WuXi Agreement:

AB122/GLS010 (Arcus and Gloria)

Our partner, WuXi, has outlicensed the rights to certain programs using the OmniAb technology to Arcus and Gloria. Arcus is conducting multiple Phase 1 trials to evaluate the safety and tolerability of AB122 in subjects with advanced solid tumors. Additionally, Gloria, is conducting a Phase 2 trial in China to evaluate the efficacy and safety of GLS-010 injection in the treatment of recurrent or refractory classical Hodgkin's lymphoma. Under the terms of our agreement with WuXi, we are entitled to royalties on potential future sales.

CS1001 (CStone)

WuXi has also outlicensed the rights to certain programs using the OmniAb technology to CStone. CStone, is currently conducting a Phase 2 trial to evaluate the efficacy and safety of CS1001 to treat patients with natural killer cell/T-cell lymphoma and classical Hodgkin's lymphoma. Under the terms of our agreement with WuXi, we are entitled to royalties on potential future sales.

SB206 (Novan)

We acquired certain economic rights to SB206 from Novan in May 2019. SB206 is a topical nitric-oxide antiviral gel for the treatment of viral skin infections, including molluscom contagiosum (MC). MC is an infection which causes skin-lesion that affects approximately 6 million people in the United States annually, with the greatest incidence in children aged one to 14 years. In Q1 2020, Novan announced that it did not achieve statistically significant results for its primary end point from its

Phase 3 pivotal trials of SB206 in MC. Novan continues to explore financial as well as strategic options in order to progress SB206.

Ciforadenant – CPI-444 (Corvus)

Our partner, Corvus, is conducting a Phase 1b/2 clinical trial in patients with renal cell carcinoma and metastatic castration resistant prostate cancer to evaluate Ciforadenant, an antagonist of adenosine A2A, in combination with the immunotherapy drug atezolizumab. Positive preliminary data was presented in February at ASCO 2020 Genitourinary Cancers Symposium (ASCO-GU) and additional data will be presented at ASCO 2020 in May/June. Ciforadenant is also being evaluated in a Phase 1b/2 trial in combination with atezolizumab in patients with non-small cell lung cancer who have failed no more than two prior regimens. Under the terms of our agreement with Corvus, we are entitled to development and regulatory milestones and tiered royalties on potential future sales. The aggregate potential milestone payments from Corvus are approximately $220 million for all indications.

Perampanel IV (Eisai)

Our partner, Eisai, recently completed an open-label, single group assignment, multicenter, Phase 2 study in Japan to evaluate the safety and tolerability of intravenous perampanel, formulated with Captisol, as substitute for oral tablets as an adjunctive therapy in patients with partial onset seizures (including secondarily generalized seizures) or primary generalized tonic-clonic seizures. The primary endpoint was the number of patients with adverse events and serious adverse events. We are entitled to revenue from Captisol material sales and tiered royalties on potential future sales.

USL-311 (Proximagen)

Our partner Proximagen, a wholly owned subsidiary of ACOVA, is developing USL-311, a CXCR4 antagonist, for the potential treatment of glioblastoma (GBM) and solid tumors. Proximagen is also investigating USL-311 for the potential treatment of inflammation. USL-311 is currently in a Phase 1/2 trial in patients with advanced solid tumors and relapsed/recurrent GBM. We are entitled to development and regulatory milestones and royalties on potential future sales.

Pradefovir (Xi'an Xintong)

Our Chinese licensee, Xi'an Xintong Medicine Research (following its acquisition of Chiva Pharmaceuticals), are developing pradefovir, an oral liver-targeting prodrug of the HBV DNA polymerase/reverse transcriptase inhibitor adefovir, for the potential treatment of hepatitis B virus (HBV) infection. Pradefovir was developed using Ligand's HepDirect technology. In September 2019, Xi'an Xintong Medicine Research reported positive results from a Phase 2 trial of pradefovir, showing good efficacy, safety and tolerability. At the dose of 75 mg, the reduction of DNA viral load, the percentage of no viral load detected, and HBeAg negative conversion rate were better than tenofovir disoproxil fumarate (TDF) after 24 weeks of treatment. Overall incidence of side effects was less than TDF and there was no renal or skeletal toxicity. Xi'an Xintong Medicine Research is planning for a Phase 3 trial. We are entitled to an annual licensing maintenance fee and royalties on potential future sales.

MB07133 (Xi'an Xintong)

Chinese licensee Xi'an Xintong Medicine Research are also developing MB07133, a liver specific, HepDirect prodrug of cytarabine monophosphate, for the potential treatment of hepatocellular carcinoma (HCC) and intrahepatic cholangiocarcinoma. MB07133 is currently in Phase 1 in China. We are entitled to an annual licensing maintenance fee and royalties on potential future sales.

Royalties

We have multiple programs under license with other companies that have products that are already being commercialized. In addition to the table below, we have generally described a typical Captisol and OmniAb royalty arrangement as low- to mid-single digit royalties. The following table represents substantially all of the disclosed information about our royalty arrangements:

Royalty Table

Ligand Licenses With Tiered Royalties		
Program	Licensee	Royalty Rate
CE-Budesonide	Sedor	8.0% - 10.0%
CE-Meloxicam	Sedor	8.0% - 10.0%
Ciforadenant	Corvus	Mid-single digit to low-teen royalty
DGAT-1	Viking	3.0% - 7.0%
Duavee	Pfizer	0.5% - 2.5%
Ensifentrine (RPL554)	Verona	Low to mid-single digit royalty
FBPase Inhibitor (VK0612)	Viking	7.5% - 9.5%
IRAK4	TG Therapeutics	6.0% - 9.5%
Kyprolis	Amgen	1.5% - 3.0%
Lasofoxifene	Sermonix	6.0% - 10.0%
Mineral Coated Microparticle	Dianomi	2.0% - 3.0%
OmniAb-Genagon	Genagon	4.0% - 6.0%
OmniAb-GigaGen	GigaGen	Mid-single digit royalty
OmniAb-iMetabolic	iMetabolic	<6%
OmniAb-Kira	Kira	Low to mid-single digit royalty
OmniAb-Takeda	Takeda	Low single digit royalty
Oral EPO	Viking	4.5% - 8.5%
PTX-022	Palvella	5.0% - 9.8%
RVT-1502	Metavant	Low double digit to mid-teen royalty
SARM (VK5211)	Viking	7.25% - 9.25%
SB206	Novan	7.0% - 10.0%
TR Beta (VK2809 and VK0214)	Viking	3.5% - 7.5%
Viviant/Conbriza	Pfizer	0.5% - 2.5%
Various	Nucorion	4.0% - 9.0%
Various	Seelos	4.0% - 10.0%

Ligand Licenses With Fixed Royalties

Program	Licensee	Royalty Rate
4-1BB	Zhilkang Hongyi	Low single digit royalty
AB122	Arcus	Low single digit royalty
Baxdela	Melinta	2.5%
CE-Fosphenytoin	Sedor	11%
CS1001	CStone	Low single digit royalty
Evomela	Acrotech/CASI	20%
KLM465	Novartis	14.5% (6.5% in year one)
MB07133	Xi'an Xintong	6%
ME-143	MEI Pharma	Low single digit royalty
ME-344	MEI Pharma	Low single digit royalty
OmniAb-KSQ Therapeutics	KSQ Therapeutics	Single digit royalty
PCSK-9	Genekey	Low single digit royalty
Pradefovir	Xi'an Xintong	9%
Reproxalap	Aldeyra Therapeutics	Low single digit royalty
Sparsentan	Retrophin	9%
Various	Gloria	Low single digit royalty
Zulresso	SAGE	3%

Contract Payments (Milestones)

Many of our programs under license with our partners will generate contract payments to us if our partners reach certain development, regulatory and commercial milestones. The following table represents the potential maximum value of our contract payment pipeline on milestones by development stage, technology and partner (in thousands):

Technology*		Stage*		Partner*	
OmniAb	> $800,000	Preclinical	> $20,000	Viking	$1,500,000
Captisol	> $180,000	Clinical	> $450,000	Janssen	$238,000
Vernalis	> $350,000	Regulatory	> $1,600,000	Seelos	$139,000
LTP/Hep Direct	> $275,000	Commercial	> $1,200,000	Retrophin	$100,000
NCE/Other	> $1,700,000	Other	> $50,000	Corvus	$91,000
Total	> $3,300,000	Total	> $3,300,000	Xi'an Xintong	$44,000
				Other	> $1,188,000
				Total	> $3,300,000

**All tables exclude our annual access fees and collaboration revenue for development work.*

Internal Development Programs

We have a number of internal development or unpartnered programs focused on a wide-range of potential indications or disease. In July 2019, we announced positive top-line results from a Phase 1 clinical trial of our internal Captisol-enabled (CE) Iohexol program. The trial achieved the primary endpoint by demonstrating pharmacokinetic bioequivalence of CE-Iohexol injection and a reference Iohexol injection (OMNIPAQUE™) after IV administration in healthy adults. CE-Iohexol injection was well tolerated, and adverse events were in line with the known safety profile of OMNIPAQUE. On November 8, 2019, we presented the positive results from the Phase 1 clinical trial at ASN Kidney week 2019 in Washington D.C. The CE-Iohexol program was established in January 2018 to develop a Captisol-enabled, next-generation contrast agent for diagnostic imaging with a reduced risk of renal toxicity. CI-AKI is the acute impairment of renal function following intravascular administration of an iodinated contrast agent, and occurs most frequently following coronary angiography, percutaneous coronary intervention and contrast-enhanced computed tomography, especially among patients at risk of renal injury such as those with advanced age, diabetes or heart failure. Currently no products are approved to prevent or treat CI-AKI in this setting, and therefore We believe a significant opportunity exists for a safer formulation of contrast agents. The goal is for CE-Iohexol to improve upon the limitations of existing contrast agents and enable a future partner to gain meaningful market share. We plan to submit an IND with the FDA and initiate a Phase 2 study in the U.S. in second half of 2020.

Our primary research and development efforts are led by our teams in Emeryville, California and Cambridge, England. The following table represents internal programs eligible for further development or partnership:

Program	Development Stage	Targeted Indication or Disease
Luminespib/Hsp90 Inhibitor	Phase 2	Oncology
FAAH Inhibitor	Phase 1	Pain
CE-Sertraline, Oral Concentrate	Phase 1	Depression
CE-Iohexol	Phase 1	Diagnostics
CCR1 Antagonist	Preclinical	Oncology
CE-Busulfan	Preclinical	Oncology
CE-Cetirizine Injection	Preclinical	Allergy
CE-Silymarin for Topical formulation	Preclinical	Sun damage
FLT3 Kinase Inhibitors	Preclinical	Oncology
GCSF Receptor Agonist	Preclinical	Blood disorders
Liver Specific Glucokinase Activator	Preclinical	Diabetes
Anti-B7-H3	Preclinical	Oncology
Anti-TIM3	Preclinical	Oncology
Anti-TIGIT	Preclinical	Oncology
Anti-CD38	Preclinical	Oncology
Chk1 Inhibitor	Preclinical	Oncology

Manufacturing

We contract with a third party manufacturer, Hovione, for Captisol production. Hovione operates FDA-inspected sites in the United States, Macau, Ireland and Portugal. Manufacturing and distribution operations for Captisol are performed primarily at Hovione's Portugal and Ireland facilities. We believe we maintain adequate inventory of Captisol to meet our current and future partner needs.

In the event of a Captisol supply interruption, we are permitted to designate and, with Hovione's assistance, qualify one or more alternate suppliers. If the supply interruption continues beyond a designated period, we may terminate the agreement. In addition, if Hovione cannot supply our requirements of Captisol due to an uncured force majeure event, we may also obtain Captisol from a third party and have previously identified such parties.

The current term of the agreement with Hovione is through December 2024. The agreement will automatically renew for successive two year renewal terms unless either party gives written notice of its intention to terminate the agreement no less than two years prior to the expiration of the initial term or renewal term. In addition, either party may terminate the agreement for the uncured material breach or bankruptcy of the other party or an extended force majeure event. We may terminate the agreement for extended supply interruption, regulatory action related to Captisol or other specified events. We have ongoing minimum purchase commitments under the agreement.

Competition

Some of the drugs we and our licensees and partners are developing may compete with existing therapies or other drugs in development by other companies. Furthermore, academic institutions, government agencies and other public and private organizations conducting research may seek patent protection with respect to potentially competing products or technologies and may establish collaborative arrangements with our competitors.

Our Captisol business may face competition from other suppliers of similar cyclodextrin excipients or other technologies that are aimed to increase solubility or stability of APIs. Our OmniAb antibody technology faces competition from suppliers of other transgenic animal systems that are also available for antibody drug discovery.

Our competitive position also depends upon our ability to obtain patent protection or otherwise develop proprietary products or processes. For a discussion of the risks associated with competition, see below under *"Item 1A. Risk Factors."*

Environmental, Health and Safety (EHS)

We are committed to providing a safe and healthy workplace, promoting environmental excellence in our communities, and complying with all relevant regulations and industry standards. We establish and monitor programs to reduce pollution, prevent injuries, and maintain compliance with applicable regulations. By focusing on such practices, we believe we can affect a meaningful, positive change in our community and maintain a healthy and safe environment. During 2019, our animal health facility in Emeryville, California, received accreditation from Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC), a nonprofit organization that promotes the humane treatment of animals in science through voluntary accreditation and assessment programs. We expect to continue our effort and to refine our EHS policies and practices in 2020.

Government Regulation

The research and development, manufacturing and marketing of pharmaceutical products are subject to regulation by numerous governmental authorities in the United States and other countries. We and our partners, depending on specific activities performed, are subject to these regulations. In the United States, pharmaceuticals are subject to regulation by both federal and various state authorities, including the FDA. The Federal Food, Drug and Cosmetic Act and the Public Health Service Act govern the testing, manufacture, safety, efficacy, labeling, storage, record keeping, approval, advertising and promotion of pharmaceutical products. These activities are subject to additional regulations that apply at the state level. There are similar regulations in other countries as well. For both currently marketed products and products in development, failure to comply with applicable regulatory requirements can, among other things, result in delays, the suspension of regulatory approvals, as well as possible civil and criminal sanctions. In addition, changes in existing regulations could have a material adverse effect on us or our partners. For a discussion of the risks associated with government regulations, see below under "*Item 1A. Risk Factors.*"

Patents and Proprietary Rights

We believe that patents and other proprietary rights are important to our business. Our policy is to file patent applications to protect technology, inventions and improvements to our inventions that are considered important to the development of our business. We also rely upon trade secrets, know-how, continuing technological innovations and licensing opportunities to develop and maintain our competitive position.

Patents are issued or pending for the following key products or product families. The scope and type of patent protection provided by each patent family is defined by the claims in the various patents. Patent term may vary by jurisdiction and depend on a number of factors including potential patent term adjustments, patent term extensions, and terminal disclaimers. For each product or product family, the patents and/or applications referred to are in force in at least the United States, and for most products and product families, the patents and/or applications are also in force in European jurisdictions, Japan and other jurisdictions.

Promacta

Patents covering Promacta are owned by Novartis. During the first quarter of 2019, we sold our Promacta related intellectual property rights to RPI Finance Trust, doing business as "Royalty Pharma". We expect no future royalty revenue from Promacta.

Kyprolis

Patents protecting Kyprolis include those owned by Amgen and those owned by us. The United States patent listed in the Orange Book relating to Kyprolis with the latest expiration date is not expected to expire until 2029. Patents and applications owned by Ligand relating to the Captisol component of Kyprolis are not expected to expire until 2033. Amgen has filed suit against several generic drug companies over their applications to make generic versions of Kyprolis, with a decision expected by April 2020. The type of patent protection (*e.g.*, composition of matter or use) for each patent listed in the Orange Book and the expiration dates for each patent listed in the Orange Book are provided in the following table. In addition, certain related patents in the commercially important jurisdictions of Europe and Japan are identified in the following table.

Kyprolis					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡
CoM	7,232,818	4/14/2025	EU	1,745,064	4/14/2025
			EU	1,781,688	8/8/2025
			EU	2,266,999	8/8/2025
			EU	2,270,026	8/8/2025
			EU	3,101,026	8/8/2025
			Japan	4,743,720	8/8/2025
			Japan	5,394,423	4/14/2025
CoM	7,417,042	7/20/2026	EU	1,781,688	8/8/2025
			EU	2,266,999	8/8/2025
			EU	2,270,026	8/8/2025
			EU	3,101,026	8/8/2025
			Japan	4,743,720	8/8/2025
			Japan	5,394,423	4/14/2025
Use	7,491,704	4/14/2025	EU	1,745,064	4/14/2025
			EU	1,781,688	8/8/2025
			EU	2,266,999	8/8/2025
			EU	2,270,026	8/8/2025
			EU	3,101,026	8/8/2025
			Japan	4,743,720	8/8/2025
			Japan	5,394,423	4/14/2025
CoM	7,737,112	12/7/2027	EU	1,819,353	12/7/2025
			EU	2,260,835	12/7/2025
			EU	2,261,236	12/7/2025
			Japan	4,990,155	12/7/2025
			Japan	5,108,509	5/9/2025
Use	8,129,346	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
CoM	8,207,125	4/14/2025	EU	1,781,688	8/8/2025
			EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
			Japan	4,743,720	8/8/2025
CoM / Use	8,207,126	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
Use	8,207,127	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
CoM / Use	8,207,297	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
CoM	9,493,582	2/27/2033	Japan	6,517,725	2/27/2033
Use	9,511,109	10/21/2029	EU	2,796,134	10/21/2029
			Japan	5,675,629	10/21/2029
			Japan	6,081,964	10/21/2029

‡Expiration dates of European and Japanese patents are calculated as 20 years from the earliest nonprovisional filing date to which priority is claimed, and do not take into account extensions that are or may be available in these jurisdictions.

Captisol

Patents and pending patent applications covering Captisol and methods of making Captisol are owned by us. The patents covering the Captisol product, if issued, with the latest expiration date would not be set to expire until 2033 (*see, e.g.,* U.S. Patent No. 9,493,582 (expires Feb. 27, 2033)). Other patent applications covering methods of making Captisol, if issued, potentially have terms to 2040. We have asserted U.S. Patents 8,410,077, 9,200,088, and 9,493,582 against Teva in connection with their attempt to obtain FDA approval to manufacture and sell a generic version of EVOMELA®. We also own several patents and pending patent applications covering drug products containing Captisol as a component. The type of patent protection (*e.g*., composition of matter or use) and the expiration dates for several issued patents covering Captisol are provided in the following table. In addition, certain related patents and applications in the commercially important jurisdictions of Europe and Japan are listed in the following table.

Captisol					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡
CoM	8,114,438	10/26/2025	EU	2,708,225	4/22/2025
			Japan	6,141,906	4/22/2025
			Japan	6,538,739	4/22/2025
CoM	10,117,940	4/22/2025	EU	2,708,225	4/22/2025
			Japan	6,141,906	4/22/2025
			Japan	6,538,739	4/22/2025
CoM	7,629,331	10/26/2025	EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			Japan	5,465,432	10/26/2026
Use	8,049,003	12/19/2026	EU	2,583,668	10/26/2025
CoM	8,846,901	10/26/2025	EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			Japan	5,465,432	10/26/2026
CoM	8,829,182	10/26/2025	EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			EU	2,952,197	10/26/2025
			Japan	5,465,432	10/26/2026
CoM/Use/MoM	9,617,352	6/8/2026	EU	2,952,197	10/26/2025
CoM/MoM	10,202,468	10/26/2025	N/A		
CoM / Use	7,635,773	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	8,410,077	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029

CoM	9,200,088	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	9,750,822	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	10,117,951	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
MoM	9,751,957	6/28/2033	EU	2,814,849	2/14/2033
			Japan	6,508,944	2/14/2033
CoM	9,493,582	2/27/2033	Japan	6,517,725	2/27/2033
MoM	10,323,103	2/27/2033	Japan	6,517,725	2/27/2033
CoM/MoM	10,040,872	2/27/2033	Japan	6,557,144	10/21/2033

‡ Expiration date of European and Japanese patents are calculated as 20 years from the earliest nonprovisional filing date to which priority is claimed, and do not take into account extensions that are or may be available in these jurisdictions.

Subject to compliance with the terms of the respective agreements, our rights to receive royalty payments under our licenses with our exclusive licensors typically extend for the life of the patents covering such developments. For a discussion of the risks associated with patent and proprietary rights, see below under "*Item 1A. Risk Factors.*"

OmniAb

Our OmniAb® therapeutic antibody platforms, including OmniRat®, OmniMouse® and OmniChicken™, produce naturally optimized, fully human antibodies in animals. We have received patent protection on OmniAb antibodies and methods in 30 countries, including the United States, multiple countries throughout Europe, Japan and China (see selected cases listed in the table below) and have 56 patent applications pending in 24 countries worldwide. The patents and applications owned by us are expected to expire between 2028 and 2034 and partners are able to use the OmniAb patented technology to generate novel antibodies, which may be entitled to additional patent protection.

OmniAb in OmniMouse and OmniRat					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡
CoM	8,703,485	10/10/2031	EU	2,152,880	5/30/2028
			EU	2,336,329	5/30/2028
			EU	2,603,323	5/30/2028
			Japan	5,823,690	5/30/2028
			Japan	6,220,827	5/30/2028
	9,388,233	5/30/2028	N/A		
	10,072,069	5/30/2028	N/A		
Use	8,907,157	5/30/2028	N/A		
CoM/Use	9,475,859	4/15/2034	N/A		
CoM	10,285,132	1/8/2034	N/A		

OmniAb in OmniChicken					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡
CoM/Use	8,030,095	12/23/2029	Europe	2,271,657	3/2/2029
MoM	8,415,173	3/2/2029	Japan	5,737,707	3/2/2029
CoM	8,592,644	8/30/2030	Japan	5,756,802	8/11/2030
CoM	9,404,125	12/29/2030	N/A		
Use	9,549,538	8/11/2030	N/A		
CoM/Use	10,010,058	8/11/2030	N/A		
CoM/Use	10,172,334	8/11/2030	N/A		
CoM/Use	10,362,770	8/11/2030	N/A		
CoM/MoM/Use	8,865,462	5/8/2032	N/A		
Com/MoM/Use	9,644,178	1/7/2031	N/A		
CoM	9,380,769	5/23/2032	EU	2,713,712	5/23/2032
CoM	9,809,642	5/23/2032	N/A		
CoM/Use	9,394,372	10/16/2032	N/A		
CoM	9,982,062	10/16/2032	N/A		

‡ Expiration date of European and Japanese patents are calculated as 20 years from the earliest nonprovisional filing date to which priority is claimed, and do not take into account extensions that are or may be available in these jurisdictions.

Vernalis

Our acquisition of Vernalis in October 2018 provided us with a portfolio of fully-funded shots on goal, which now include RPL554, a Phase 2, novel treatment for COPD, which is partnered with Verona; Ciforadenant, a Phase 1 adenosine A2A receptor antagonist for treatment of solid tumors, partnered with Corvus; Tosedostat, an aminopeptidase inhibitor for treatment of blood cancers, partnered with Cell Therapeutics, Inc. (CTI), S65487, a Bcl-2 inhibitor, and S64315, an Mcl-1 inhibitor for treatment of cancers, both of which are partnered with Servier in collaboration with Novartis, and VER250840 (an oral, selective Chk1 inhibitor for treatment of cancer) partnered with Cumulus. Vernalis has a worldwide patent portfolio of over 240 granted patents and over 20 pending applications, spanning over 60 countries.

Employees

As of February 10, 2020, we have 115 employees, of whom 86 are involved directly in scientific research and development activities. We emphasize competitive compensation, benefits, equity participation, and a positive and attractive work environment in our efforts to attract and retain qualified personnel.

Investor Information

Financial and other information about us is available on our website at www.ligand.com. We make available on our website, without charge, copies of our Annual Report 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 Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the U.S. Securities and Exchange Commission, or SEC. You may obtain copies of these documents by visiting the SEC's website at www.sec.gov. These website addresses are not intended to function as hyperlinks, and the information contained in our website and in the SEC's website is not intended to be a part of this filing.

ITEM 1A. RISK FACTORS

The following is a summary description of some of the many risks we face in our business. You should carefully review these risks in evaluating our business, including the businesses of our subsidiaries. You should also consider the other information described in this report. Additional risks not presently known to us or that we currently deem immaterial also may impair our business.

Risks Related to Our Business Operations and Reliance on Third Parties:

Future revenue based on Kyprolis and Evomela, as well as royalties from our other partnered products, may be lower than expected.

Substantially all of our royalty revenue is based on sales of Kyprolis by Amgen and sales of Evomela by Acrotech Biopharma. Royalties, including payments from Amgen and Acrotech Biopharma, are expected to be a substantial portion of our ongoing revenues for the foreseeable future. Any setback that may occur with respect to any of our partners' products, and in particular Kyprolis, could significantly impair our operating results and/or reduce our revenue and the market price of our stock. Setbacks for the products could include problems with shipping, distribution, manufacturing, product safety, marketing, government regulation or reimbursement, licenses and approvals, intellectual property rights, including Amgen's or Acrotech Biopharma's failure to enforce their respective intellectual property rights, competition with existing or new products and physician or patient acceptance of the products, as well as higher than expected total rebates, returns, discounts, or unfavorable exchange rates. These products also are or may become subject to generic competition. For example, we entered into a settlement agreement with Teva and Acrotech Biopharma (the holder of the NDA for Evomela) which will allow Teva to market a generic version of Evomela in the United States on June 1, 2026, or earlier under certain circumstances. The entry of generic competition for Evomela may materially and adversely affect the revenue we derive from Evomela sales. Also, Amgen has settled patent litigation related to Kyprolis on confidential terms with several parties, but it has been publicly reported that the U.S. launch date for at least Breckenridge Pharmaceuticals' applicable generic product will be "on a date that is held as confidential in 2027 or sooner, depending on certain occurrences" and litigation against one other party is awaiting a post-trial judgement.

Future revenue from sales of Captisol material to our license partners may be lower than expected.

Revenues from sales of Captisol material to our collaborative partners, including Amgen, represent a significant portion of our current revenues. Any setback that may occur with respect to Captisol could significantly impair our operating results and/or reduce the market price of our stock. Setbacks for Captisol could include problems with shipping, distribution, manufacturing, product safety, marketing, government regulation or reimbursement, licenses and approvals, intellectual property rights, competition with existing or new products and physician or patient acceptance of the products using Captisol.

If products or product candidates incorporating Captisol material were to cause any unexpected adverse events, the perception of Captisol safety could be seriously harmed. If this were to occur, we may not be able to sell Captisol unless and until we are able to demonstrate that the adverse event was unrelated to Captisol, which we may not be able to do. Further, the FDA could require us to submit additional information for regulatory review or approval, including data from extensive safety testing or clinical testing of products using Captisol. This would be expensive and it may delay the marketing of Captisol-enabled products and receipt of revenue related to those products, which could significantly impair our operating results and/or reduce the market price of our stock.

We obtain Captisol from a sole source supplier, and if this supplier were to cease to be able, for any reason, to supply Captisol to us in the amounts we require, or decline to supply Captisol to us, we would be required to seek an alternative source, which could potentially take a considerable length of time and impact our revenue and customer relationships. We maintain inventory of Captisol, which has a five year shelf life, at three geographically dispersed storage locations in the United States and Europe. If we were to encounter problems maintaining our inventory, such as natural disasters, at one or more of these locations, it could lead to supply interruptions. While we believe we maintain adequate inventory of Captisol to meet our current and expected future partner needs, our estimates and projections for Captisol demand may be wrong and any supply interruptions could materially adversely impact our operating results.

We currently depend on our arrangements with our partners and licensees to sell products using our Captisol technology. These agreements generally provide that our partners may terminate the agreements at will. If our partners discontinue sales of products using Captisol, fail to obtain regulatory approval for products using Captisol, fail to satisfy their obligations under their agreements with us, or choose to utilize a competing product, or if we are unable to establish new licensing and marketing relationships, our financial results and growth prospects would be materially affected. Furthermore, we maintain significant accounts receivable balances with certain customers purchasing Captisol materials, which may result in the concentration of credit risk. We generally do not require any collateral from our customers to secure payment of these accounts receivable. If any of our major customers were to default in the payment of their obligations to us, our business, operating results and cash flows could be adversely affected.

Further, under most of our Captisol outlicenses, the amount of royalties we receive will be reduced or will cease when the relevant patent expires. Our low-chloride patents and foreign equivalents are not expected to expire until 2033, our high

purity patents and foreign equivalents, are not expected to expire until 2029 and our morphology patents and foreign equivalents, are not expected to expire until 2025, but the initially filed patents relating to Captisol expired starting in 2010 in the United States and in 2016 in most countries outside the United States. If our other intellectual property rights are not sufficient to prevent a generic form of Captisol from coming to market and if in such case our partners choose to terminate their agreements with us, our Captisol revenue may decrease significantly.

We rely heavily on collaboration relationships to generate milestone and royalty payments and our collaboration partners have significant discretion when deciding whether to pursue any development program, and any failure by our partners to successfully develop a product candidate or a termination or breach of any of the related agreements could reduce our milestone and license fee revenue, and potential reduce future royalties.

Our strategy for developing and commercializing many of our product candidates includes entering into collaboration agreements, outlicenses, and development funding and royalty purchase agreements with corporate partners and others. These agreements give our collaboration partners significant discretion when deciding whether or not to pursue any development program. Our existing collaborations may not continue or be successful, and we may be unable to enter into future collaboration arrangements to develop and commercialize our unpartnered assets.

In addition, our collaborators may develop products, either alone or with others that compete with the types of products they are developing with us (or that we are developing on our own). This would result in increased competition for our or our partners' programs. If product candidates are approved for marketing under our collaboration programs, revenues we receive will depend on the manufacturing, marketing and sales efforts of our collaboration partners, who generally retain commercialization rights under the collaboration agreements. Generally, our current collaboration partners also have the right to terminate their collaborations at will or under specified circumstances. If any of our collaboration partners breach (for example, by not making required payments when due, or at all) or terminate their agreements with us or otherwise fail to conduct their collaboration activities successfully, including due to insolvency events, ongoing product development under these agreements will be delayed or terminated. Disputes or litigation may also arise with our collaborators (with us and/or with one or more third parties), including those over ownership rights to intellectual property, know-how or technologies developed with our collaborators. Such disputes or litigation could adversely affect our rights to one or more of our product candidates. Any such dispute or litigation could delay, interrupt or terminate the collaboration research, development and commercialization of certain potential products, create uncertainty as to ownership rights of intellectual property, or could result in litigation or arbitration. The occurrence of any of these problems could be time-consuming and expensive and could adversely affect our business.

Our collaboration partners may change their strategy or the focus of their development and commercialization efforts with respect to our partnered programs, and the success of our partnered programs could be adversely affected.

If our collaboration partners terminate their collaborations with us or do not commit sufficient resources to the development, manufacture, marketing or distribution of our partnered programs, we could be required to devote additional resources to our partnered programs, seek new collaboration partners or abandon such partnered programs, all of which could reduce our revenues and otherwise have an adverse effect on our business. For example, several of our collaboration partners using our OmniAb antibody platform have terminated their contracts or substantially reduced their investment in the antibodies discovered based on the platform. Although we expect growth in the net number of partners with one more active programs based on antibodies discovered using our OmniAb platform, there can be no assurance that our partners will continue their programs or that we will be able to find new collaboration partners interested in discovering antibodies based on our OmniAb platform.

Our product candidates, and the product candidates of our partners, face significant development and regulatory hurdles prior to partnering and/or marketing which could delay or prevent licensing, sales-based royalties and/or milestone revenue.

Before we or our partners obtain the approvals necessary to sell any of our unpartnered assets or partnered programs, we must show through preclinical studies and human testing that each potential product is safe and effective. We and/or our partners have a number of partnered programs and unpartnered assets moving toward or currently awaiting regulatory action. Failure to show any product's safety and effectiveness could delay or prevent regulatory approval of a product and could adversely affect our business. The product development and clinical trials process is complex and uncertain. For example, the results of preclinical studies and initial clinical trials may not necessarily predict the results from later large-scale clinical trials. In addition, clinical trials may not demonstrate a product's safety and effectiveness to the satisfaction of the regulatory authorities. A number of companies have suffered significant setbacks in advanced clinical trials or in seeking regulatory approvals, despite promising results in earlier trials. The FDA may also require additional clinical trials after regulatory

approvals are received. Such additional trials may be expensive and time-consuming, and failure to successfully conduct those trials could jeopardize continued commercialization of a product.

The speed at which we and our partners complete our scientific studies and clinical trials depends on many factors, including, but not limited to, the ability to obtain adequate supplies of the products to be tested and patient enrollment. Patient enrollment is a function of many factors, including the size of the patient population, the proximity of patients to clinical sites, the eligibility criteria for the trial and other potential drug candidates being studied. Delays in patient enrollment for our or our partners' trials may result in increased costs and longer development times. In addition, our partners have rights to control product development and clinical programs for products developed under our collaborations. As a result, these partners may conduct these programs more slowly or in a different manner than expected. Moreover, even if clinical trials are completed, we or our partners still may not apply for FDA or foreign regulatory approval in a timely manner or the FDA or foreign regulatory authority still may not grant approval.

Our product candidate discovery, early-stage development, and product reformulation programs may require substantial additional capital to complete successfully. Our partners' development programs may require substantial additional capital to complete successfully, arising from costs to: conduct research, preclinical testing and human studies; establish pilot scale and commercial scale manufacturing processes and facilities; and establish and develop quality control, regulatory, marketing, sales and administrative capabilities to support these programs. While we expect to fund our research and development activities from cash generated from operations to the extent possible, if we are unable to do so, we may need to complete additional equity or debt financings or seek other external means of financing. These financings could depress our stock price. If additional funds are required to support our operations and we are unable to obtain them on terms favorable to us, we may be required to cease or reduce further development or commercialization of our products, to sell some or all of our technology or assets or to merge with another entity.

Our OmniAb antibody platform faces specific risks, including the fact that no product using antibodies from the platform has been approved by the FDA or similar regulatory agency.

None of our collaboration partners using our OmniAb antibody platform have received approval from the FDA or similar regulatory agency to market a product discovered based on our platform. In addition, only a few of our collaboration partners' product candidates based on the platform have been tested in late stage clinical trials. If one of our OmniAb collaboration partners' product candidates fails during preclinical studies or clinical trials, our other OmniAb collaboration partners may decide to abandon product candidates using antibodies generated from the OmniAb platform, whether or not such failure is attributable to the platform. All of our OmniAb collaboration partners may terminate their programs at any time without penalty. In addition, our OmniRat and OmniFlic platforms, which we consider the most promising, are covered by six patents within the U.S. and three patents in the European Union and are subject to the same risks as our patent portfolio discussed elsewhere, including the risk that our patents may infringe on third party patent rights or that our patents may be invalidated. As of a result of these factors, the future revenue generated from this platform may be materially lower than what we currently anticipate. Further, we face significant competition from other companies selling human antibody-generating rodents, especially mice which compete with our OmniMouse platform, including the VelocImmune mouse, the AlivaMab mouse, the Trianni mouse and the Kymouse. Many of our competitors have greater financial, technical and human resources than we do and may be better equipped to develop, manufacture and market competing antibody platforms.

Risks Related to Intellectual Property:

Third party intellectual property may prevent us or our partners from developing our potential products; our and our partners' intellectual property may not prevent competition; and any intellectual property issues may be expensive and time consuming to resolve.

The manufacture, use or sale of our potential products or our licensees' products or potential products may infringe the patent rights of others. If others obtain patents with conflicting claims, we may be required to obtain licenses to those patents or to develop or obtain alternative technology. We may not be able to obtain any such licenses on acceptable terms, or at all. Any failure to obtain such licenses could delay or prevent us from pursuing the development or commercialization of our potential products.

Generally, our success will depend on our ability and the ability of our partners to obtain and maintain patents and other intellectual property rights for our and their potential products. Our patent position is uncertain and involves complex legal and technical questions for which legal principles are unresolved. Even if we or our partners do obtain patents, such patents may not adequately protect the technology we own or have licensed.

We permit our partners to list our patents that cover their branded products in the Orange Book. If a third party files an NDA or ANDA for a generic drug product that relies in whole or in part on studies contained in our partner's NDA for their branded product, the third party will have the option to certify to the FDA that, in the opinion of that third party, the patents listed in the Orange Book for our partner's branded product are invalid, unenforceable, or will not be infringed by the manufacture, use or sale of the third party's generic drug product. A third party certification that a new product will not infringe Orange Book-listed patents, or that such patents are invalid, is called a paragraph IV patent certification. If the third party submits a paragraph IV patent certification to the FDA, a notice of the paragraph IV patent certification must be sent to the NDA owner and the owner of the patents that are subject to the paragraph IV patent certification notice once the third-party's NDA or ANDA is accepted for filing by the FDA. A lawsuit may then be initiated to defend the patents identified in the notice. The filing of a patent infringement lawsuit within 45 days of the receipt of notice of a paragraph IV patent certification automatically prevents the FDA from approving the generic NDA or ANDA until the earlier of the expiration of a 30-month period, the expiration of the patents, the entry of a settlement order stating that the patents are invalid or not infringed, a decision in the infringement case that is favorable to the NDA or ANDA applicant, or such shorter or longer period as the court may order. If a patent infringement lawsuit is not initiated within the required 45-day period, the third-party's NDA or ANDA will not be subject to the 30-month stay.

Several third-parties have challenged, and additional third parties may challenge, the patents covering our partner's branded products, including Kyprolis and Evomela, which could result in the invalidation or unenforceability of some or all of the relevant patent claims. We may from time to time become party to litigation or other proceedings as a result of Paragraph IV certifications. For example, as a result of the settlement of one such matter, Teva will be permitted to market a generic version of Evomela® in the United States on June 1, 2026 or earlier under certain circumstances. The terms of the settlement agreement are otherwise confidential. Also, as noted above, Amgen has settled patent litigation related to Kyprolis on confidential terms with several parties, but it has been publicly reported that the U.S. launch date for at least Breckenridge Pharmaceuticals' applicable generic product will be "on a date that is held as confidential in 2027 or sooner, depending on certain occurrences" and litigation against one other party is awaiting a post-trial judgement.

In addition, we cannot assure you that all of the potentially relevant prior art information that was or is deemed available to a person of skill in the relevant art prior to the priority date of the claimed invention-relating to our and our partners' patents and patent applications has been found. If such prior art exists, it can invalidate a patent or prevent a patent from issuing from a pending patent application, and we or our partners may be subject to a third party pre-issuance submission of prior art to the United States Patent and Trademark Office. Even if patents do successfully issue and even if such patents cover our or our partner's products or potential products, third parties may initiate litigation or opposition, interference, re-examination, post-grant review, *inter partes* review, nullification or derivation action in court or before patent offices, or similar proceedings challenging the validity, enforceability or scope of such patents, which may result in the patent claims being narrowed or invalidated, may allow third parties to commercialize our or our partners' products and compete directly with us and our partners, without payment to us or our partners, or limit the duration of the patent protection of our and our partners' technology and products.

Litigation or other proceedings to enforce or defend intellectual property rights are often very complex in nature, may be very expensive and time-consuming, may divert our management's attention from our core business, and may result in unfavorable results that could adversely impact our ability to prevent third parties from competing with our partner's products. Any adverse outcome of such litigation or other proceedings could result in one or more or our patents being held invalid or unenforceable, which could adversely affect our ability to successfully execute our business strategy and negatively impact our financial condition and results of operations. However, given the unpredictability inherent in litigation, we cannot predict or guarantee the outcome of these matters or any other litigation. Regardless of how these matters are ultimately resolved, these matters may be costly, time-consuming and distracting to our management, which could have a material adverse effect on our business.

In addition, periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and or applications will be due to the U.S. and various foreign patent offices at various points over the lifetime of our and our licensees' patents and/or applications. We have systems in place to remind us to pay these fees, and we rely on our outside patent annuity service to pay these fees when due. Additionally, the U.S. and various foreign patent offices require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. We employ reputable law firms and other professionals to help us comply, and in many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with rules applicable to the particular jurisdiction. However, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. If such an event were to occur, it could have a material adverse effect on our business.

Any conflicts with the patent rights of others could significantly reduce the coverage of our patents or limit our ability to obtain meaningful patent protection. For example, our European patent related to Agglomerated forms of Captisol was limited during an opposition proceeding, and the rejection of our European patent application related to High Purity Captisol was upheld on appeal. In addition, any determination that our patent rights are invalid may result in early termination of our agreements with our license partners and could adversely affect our ability to enter into new license agreements. We also rely on unpatented trade secrets and know-how to protect and maintain our competitive position. We require our employees, consultants, licensees and others to sign confidentiality agreements when they begin their relationship with us. These agreements may be breached, and we may not have adequate remedies for any breach. In addition, our competitors may independently discover our trade secrets.

We may also need to initiate litigation, which could be time-consuming and expensive, to enforce our proprietary rights or to determine the scope and validity of others' rights. If this occurs, a court may find our patents or those of our licensors invalid or may find that we have infringed on a competitor's rights. In addition, if any of our competitors have filed patent applications in the United States which claim technology we also have invented, the United States Patent and Trademark Office may require us to participate in expensive interference proceedings to determine who has the right to a patent for the technology.

The occurrence of any of the foregoing problems could be time-consuming and expensive and could adversely affect our financial position, liquidity and results of operations.

The validity, scope and enforceability of any patents that cover our partners' biologic product candidate can be challenged by third parties.

For biologics, the Biologics Price Competition and Innovation Act of 2009, BPCIA, provides a mechanism for one or more third parties to seek FDA approval to manufacture or sell a biosimilar or interchangeable versions of brand name biological products. Due to the large size and complexity of biological products, as compared to small molecules, a biosimilar must be "highly similar" to the reference product with "no clinically meaningful differences between the two." The BPCIA does not require reference product sponsors to list patents in an Orange Book and does not include an automatic 30-month stay of FDA approval upon the timely filing of a lawsuit. The BPCIA, however, does require a formal pre-litigation process which includes the exchange of information between a biosimilar applicant and a reference biologic sponsor that includes the identification of relevant patents and each parties' basis for infringement and invalidity. After the exchange of this information, sponsors may then initiate a lawsuit within 30 days to defend the patents identified in the exchange. If the biosimilar applicant successfully challenges the asserted patent claims it could result in the invalidation of, or render unenforceable, some or all of the relevant patent claims or result in a finding of non-infringement. Such litigation or other proceedings to enforce or defend intellectual property rights are often very complex in nature, may be very expensive and time-consuming, may divert our management's attention from our core business, and may result in unfavorable results that could limit our partners' ability to prevent third parties from competing with their products or product candidates.

Risks Related to Government Regulation and Legal Proceedings:

Market acceptance and sales of any approved product will depend significantly on the availability and adequacy of coverage and reimbursement from third-party payors and may be affected by existing and future healthcare reform measures.

Sales of the products we license to our collaboration partners and the royalties we receive will depend in large part on the extent to which coverage and reimbursement is available from government and health administration authorities, private health maintenance organizations and health insurers, and other healthcare payors. Significant uncertainty exists as to the reimbursement status of healthcare products. Healthcare payors, including Medicare, are challenging the prices charged for medical products and services. Government and other healthcare payors are increasingly attempting to contain healthcare costs by limiting both coverage and the level of reimbursement for medical products. Even if a product is approved by the FDA, insurance coverage may not be available, and reimbursement levels may be inadequate, to cover the costs associated with the research, development, marketing and sale of the product. If government and other healthcare payors do not provide adequate coverage and reimbursement levels for any product, market acceptance and any sales could be reduced.

From time to time, legislation is implemented to reign in rising healthcare expenditures. By way of example, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively, the ACA, was enacted, which included a number of provisions affecting the pharmaceutical industry, including, among other things, annual, non-deductible fees on any entity that manufactures or imports some types of branded prescription drugs and increases in Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program. Since its enactment,

there have been judicial and Congressional challenges to certain aspects of the ACA, and we expect there will be additional challenges and amendments to the ACA in the future.

Other legislative changes have been proposed and adopted since the ACA was enacted, including aggregate reductions of Medicare payments to providers of 2% per fiscal year and reduced payments to several types of Medicare providers. Moreover, there has recently 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 bills designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drug products. Individual states in the United States have also become increasingly active in implementing regulations designed to control pharmaceutical 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 cannot predict whether other legislative changes will be adopted, if any, or how such changes would affect our operations or financial condition.

We and our collaboration partners may be subject to federal and state healthcare laws, including fraud and abuse, false claims, physician payment transparency and health information privacy and security laws. Our operations and those of our collaboration partners are subject to various federal and state fraud and abuse laws, including, without limitation, anti-kickback, false claims and physician payment transparency statutes. These laws may impact, among other things, financial arrangements with physicians, sales, marketing and education programs and the manner in which any of those activities are implemented. In addition, we may be subject to federal and state patient privacy regulations. If our operations or those of our collaboration partners are found to be in violation of any of those laws or any other applicable governmental regulations, we or our collaboration partners may be subject to penalties, including civil and criminal penalties, damages, fines, imprisonment, exclusion from government healthcare programs or the curtailment or restructuring of operations, any of which could adversely affect our ability to operate our business and our financial condition.

Changes in funding for the FDA and other government agencies could hinder their ability to hire and retain key leadership and other personnel, or otherwise prevent new products and services from being developed or commercialized in a timely manner, which could negatively impact our business or the business of our partners.

The ability of the FDA to review and approve new products can be affected by a variety of factors, including government budget and funding levels, ability to hire and retain key personnel and accept the payment of user fees, and statutory, regulatory, and policy changes. Average review times at the agency have fluctuated in recent years as a result. In addition, government funding of other government agencies that fund research and development activities is subject to the political process, which is inherently fluid and unpredictable.

Disruptions at the FDA and other agencies may also slow the time necessary for new drugs to be reviewed and/or approved by necessary government agencies, which would adversely affect our business or the business of our partners. For example, over the last several years, including for 35 days beginning on December 22, 2018, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA, have had to furlough critical FDA employees and stop critical activities. If a prolonged government shutdown occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. If the timing of FDA's review and approval of new products is delayed, the timing of our or our partners' development process may be delayed which would result in delayed milestone revenues and materially harm our operations of business.

If plaintiffs bring product liability lawsuits against us or our partners, we or our partners may incur substantial liabilities and may be required to limit commercialization of our approved products and product candidates.

As is common in our industry, our partners and we face an inherent risk of product liability as a result of the clinical testing of our product candidates in clinical trials and face an even greater risk for commercialized products. Although we are not currently a party to product liability litigation, if we are sued, we may be held liable if any product or product candidate we develop causes injury or is found otherwise unsuitable during product testing, manufacturing, marketing or sale. Regardless of merit or eventual outcome, liability claims may result in decreased demand for any product candidates, partnered products or products that we may develop, injury to our reputation, discontinuation of clinical trials, costs to defend litigation, substantial monetary awards to clinical trial participants or patients, loss of revenue and product recall or withdrawal from the market and the inability to commercialize any products that we develop. We have product liability insurance that covers our clinical trials up to a $10.0 million annual limit. Our insurance coverage may not be sufficient to cover all of our product liability related

expenses or losses and may not cover us for any expenses or losses we may suffer. If we are sued for any injury caused by our product candidates, partnered products or any future products, our liability could exceed our total assets.

We face risks related to handling of hazardous materials and other regulations governing environmental safety.

Our operations are subject to complex and stringent environmental, health, safety and other governmental laws and regulations that both public officials and private individuals may seek to enforce. Our activities that are subject to these regulations include, among other things, our use of hazardous materials and the generation, transportation and storage of waste. Although we have secured clearance from the EPA historically, and currently are operating in material compliance with applicable EPA rules and regulations, our business could be adversely affected if we discover that we or an acquired business is not in material compliance with these rules and regulations. In the future, we may pursue the use of other surfactant substances that will require clearance from the EPA, and we may fail to obtain such clearance. Existing laws and regulations may also be revised or reinterpreted, or new laws and regulations may become applicable to us, whether retroactively or prospectively, that may have a negative effect on our business and results of operations. It is also impossible to eliminate completely the risk of accidental environmental contamination or injury to individuals. In such an event, we could be liable for any damages that result, which could adversely affect our business.

Risk Related to Our Strategic Transactions:

Any difficulties from strategic acquisitions could adversely affect our stock price, operating results and results of operations.

We may acquire companies, businesses and products that complement or augment our existing business. We may not be able to integrate any acquired business successfully or operate any acquired business profitably. Integrating any newly acquired business could be expensive and time-consuming. Integration efforts often take a significant amount of time, place a significant strain on managerial, operational and financial resources and could prove to be more difficult or expensive than we predict. The diversion of our management's attention and any delay or difficulties encountered in connection with any future acquisitions we may consummate could result in the disruption of our ongoing business or inconsistencies in standards and controls that could negatively affect our ability to maintain third-party relationships. Moreover, we may need to raise additional funds through public or private debt or equity financing, or issue additional shares, to acquire any businesses or products, which may result in dilution for stockholders or the incurrence of indebtedness.

As part of our efforts to acquire companies, business or product candidates or to enter into other significant transactions, we conduct business, legal and financial due diligence with the goal of identifying and evaluating material risks involved in the transaction. Despite our efforts, we ultimately may be unsuccessful in ascertaining or evaluating all such risks and, as a result, might not realize the intended advantages of the transaction. If we fail to realize the expected benefits from acquisitions we may consummate in the future or have consummated in the past, whether as a result of unidentified risks, integration difficulties, regulatory setbacks, litigation with current or former employees and other events, our business, results of operations and financial condition could be adversely affected. If we acquire product candidates, we will also need to make certain assumptions about, among other things, development costs, the likelihood of receiving regulatory approval and the market for such product candidates. Our assumptions may prove to be incorrect, which could cause us to fail to realize the anticipated benefits of these transactions.

In addition, we will likely experience significant charges to earnings in connection with our efforts, if any, to consummate acquisitions. For transactions that are ultimately not consummated, these charges may include fees and expenses for investment bankers, attorneys, accountants and other advisors in connection with our efforts. Even if our efforts are successful, we may incur, as part of a transaction, substantial charges for closure costs associated with elimination of duplicate operations and facilities and acquired IPR&D charges. In either case, the incurrence of these charges could adversely affect our results of operations for particular quarterly or annual periods.

Other Risks:

Our operating results may fluctuate significantly, which makes our future operating results difficult to predict and could cause our operating results to fall below expectations or any guidance we may provide.

Our quarterly and annual operating results may fluctuate significantly, which makes it difficult for us to predict our future operating results. These fluctuations may occur due to a variety of factors, many of which are outside of our control, including, but not limited to:

- the royalties from the sales of Kyprolis, Evomela and other products sold by our partners;
- the success of our collaboration partners' preclinical and clinical programs;
- the timing of Captisol purchases for use in clinical trials and commercial products;
- the timing and cost of, and level of investment in, research, development, regulatory approval and commercialization activities relating to our internal development programs, which may change from time to time;
- expenditures that we may incur to acquire or develop additional product candidates and platform technologies; and
- future accounting pronouncements or changes in our accounting policies.

The cumulative effects of these factors could result in large fluctuations and unpredictability in our quarterly and annual operating results and revenues. This variability and unpredictability could result in our failing to meet the expectations of industry or financial analysts or investors for any period. If our revenue or operating results fall below the expectations of analysts or investors or below any forecasts we may provide to the market, or if the forecasts we provide to the market are below the expectations of analysts or investors, the price of our common stock could decline substantially. Such a stock price decline could occur even when we have met any previously publicly stated revenue or earnings guidance we may provide.

Changes or modifications in financial accounting standards, including those related to revenue recognition, may harm our results of operations.

From time to time, the FASB either alone or jointly with other organizations, promulgates new accounting principles that could have an adverse impact on our results of operations. For example, in May 2014, FASB issued an accounting standard for revenue recognition-Accounting Standards Codification Topic 606, *Revenue from Contracts with Customers*, or ASC 606-that supersedes most current revenue recognition guidance. The guidance requires a company to recognize revenue upon transfer of goods or services to a customer at an amount that reflects the expected consideration to be received in exchange for those goods or services. The guidance became effective in fiscal 2018.

Under ASC 606, Ligand estimates and books royalties in the same quarter that our partners report the sale of the underlying product. We rely on our partners' earning releases and other information from our partners to determine the sales of our partners' products and to estimate the related royalty revenues. If our partners report incorrect sales, or if our partners delay reporting of their earnings release, our royalty estimates may need to be revised and/or our financial reporting may be delayed.

Uncertainties in the interpretation and application of the 2017 Tax Cuts and Jobs Act could materially affect our tax obligations and effective tax rate.

The 2017 Tax Cuts and Jobs Act (the Tax Act) was enacted on December 22, 2017, and significantly affected U.S. tax law, including by changing how the U.S. imposes tax on certain types of income of corporations and by reducing the general U.S. corporate income tax rate. The U.S. Department of Treasury has broad authority to issue regulations and interpretative guidance that may significantly impact how we will apply the law and impact our results of operations in the period issued.

The Tax Act requires certain complex computations not previously provided in U.S. tax law. As such, the application of accounting guidance for such items is currently uncertain. Further, compliance with the Tax Act and the accounting for such provisions require accumulation of certain information not previously required or regularly produced. As a result, we have provided a provisional estimate on the effect of the Tax Act in our financial statements. As additional and other regulatory guidance is issued by the applicable taxing authorities, as accounting treatment is clarified, as we perform additional analysis on the application of the law, and as we refine estimates in calculating the effect, our final analysis, which will be recorded in the period completed, may be different from our current provisional amounts, which could materially affect our tax obligations and effective tax rate.

Our ability to use our net operating loss carryforwards and certain other tax attributes to offset future taxable income may be subject to certain limitations.

As of December 31, 2019, we had U.S. federal and state net operating loss carryforwards (NOLs) of approximately $31.5 million and $119.1 million, respectively. Our federal NOLs expire through 2037 and our state NOLs begin to expire in 2028, if not utilized. Under the Tax Act, any federal NOLs arising in taxable years ending after December 31, 2017 will carry forward indefinitely. As of December 31, 2019, we had federal and California research and development tax credit carryforwards of approximately $0.6 million and $22.9 million, respectively. The federal research and development tax credit carryforwards expire in various years through 2038, if not utilized. The California research and development credit will carry forward indefinitely. Under Sections 382 and 383 of Internal Revenue Code of 1986, as amended (Code) if a corporation undergoes an "ownership change," the corporation's ability to use its pre-change NOLs and other pre-change tax attributes, such as research

tax credits, to offset its future post-change income and taxes may be limited. In general, an "ownership change" occurs if there is a cumulative change in our ownership by "5% shareholders" that exceeds 50 percentage points over a rolling three-year period. Similar rules may apply under state tax laws. We believe we have experienced certain ownership changes in the past and have reduced our deferred tax assets related to NOLs and research and development tax credit carryforwards accordingly. In the event that it is determined that we have in the past experienced additional ownership changes, or if we experience one or more ownership changes as a result future transactions in our stock, then we may be further limited in our ability to use our NOLs and other tax assets to reduce taxes owed on the net taxable income that we earn in the event that we attain profitability. Furthermore, under the Tax Act, although the treatment of tax losses generated in tax years beginning before December 31, 2017 has generally not changed, tax losses generated in tax years beginning after December 31, 2017 may only offset 80% of our taxable income. This change may require us to pay federal income taxes in future years despite having potentially generated a loss for federal income tax purposes in prior years. Any such limitations on the ability to use our NOLs and other tax assets could adversely impact our business, financial condition and operating results.

We rely on information technology and any failure, inadequacy, interruption or security lapse of that technology, including any cyber security incidents, could harm our ability to operate our business effectively.

Our business is increasingly dependent on critical, complex and interdependent information technology systems, including internet-based systems, to support business processes as well as internal and external communications. Despite the implementation of security measures, our internal computer systems and those of our partners are vulnerable to damage from cyber-attacks, computer viruses, security breaches, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. System failures, accidents or security breaches could cause interruptions in our operations, could lead to the loss of trade secrets or other intellectual property, could lead to the public exposure of personal information of our employees and others, and could result in a material disruption of our clinical and commercialization activities and business operations, in addition to possibly requiring substantial expenditures to remedy. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and our business and financial condition could be harmed.

The occurrence of a catastrophic disaster could damage our facilities beyond insurance limits or we could lose key data which could cause us to curtail or cease operations.

We are vulnerable to damage and/or loss of vital data from natural disasters, such as earthquakes, tornadoes, power loss, fire, floods and similar events, as well as from accidental loss or destruction. If any disaster were to occur, our ability to operate our business could be seriously impaired. We have property, liability, and business interruption insurance which may not be adequate to cover our losses resulting from disasters or other similar significant business interruptions, and we do not plan to purchase additional insurance to cover such losses due to the cost of obtaining such coverage. Any significant losses that are not recoverable under our insurance policies could seriously impair our business, financial condition and prospects.

Conversion of our outstanding convertible notes may result in losses, result in the dilution of existing stockholders, create downward pressure on the price of our common stock, and restrict our ability to take advantage of future opportunities.

In May 2018, we issued $750.0 million principle amount of the 2023 Notes. The sale of the 2023 Notes may affect our earnings per share figures, as accounting procedures require that we include in our calculation of earnings per share the number of shares of our common stock into which the 2023 Notes are convertible. The convertible notes may be converted into cash and shares of our common stock, if any (subject to our right or obligation to pay cash in lieu of all or a portion of such shares). If shares of our common stock are issued to the holders of the convertible notes upon conversion, there will be dilution to our shareholders equity and the market price of our shares may decrease due to the additional selling pressure in the market. Any downward pressure on the price of our common stock caused by the sale or potential sale of shares issuable upon conversion of the convertible notes could also encourage short sales by third parties, creating additional selling pressure on our stock. Upon the occurrence of certain circumstances, holders of the convertible notes may require us to purchase all or a portion of their notes for cash, which may require the use of a substantial amount of cash. If such cash is not available, we may be required to sell other assets or enter into alternate financing arrangements at terms that may or may not be desirable. The existence of the convertible notes and the obligations that we incurred by issuing them may restrict our ability to take advantage of certain future opportunities, such as engaging in future debt or equity financing activities.

As of December 31, 2019, we had $750.0 million aggregate principal amount of 2023 Notes. The notes are convertible into cash, and if applicable, shares of our common stock under certain circumstances, including trading price conditions related to our common stock. Upon conversion, we are required to record a gain or loss for the difference between the fair value of the notes to be extinguished and their corresponding net carrying value. The fair value of the notes to be extinguished depends on our current incremental borrowing rate. If our incremental borrowing rate at the time of conversion is lower than the implied interest rate of the notes, we will record a loss in our consolidated statement of income during the period in which the notes are converted.

Impairment charges pertaining to goodwill, identifiable intangible assets or other long-lived assets from our mergers and acquisitions could have an adverse impact on our results of operations and the market value of our common stock.

The total purchase price pertaining to our acquisitions in recent years have been allocated to net tangible assets, identifiable intangible assets, in-process research and development and goodwill. To the extent the value of goodwill or identifiable intangible assets or other long-lived assets become impaired, we will be required to incur material charges relating to the impairment. Any impairment charges could have a material adverse impact on our results of operations and the market value of our common stock.

Our investments are subject to market and credit risks that could diminish their value and these risks could be greater during periods of extreme volatility or disruption in the financial and credit markets, which could adversely impact our business, financial condition, results of operations, liquidity and cash flows.

Our investments are subject to risks of credit defaults and changes in market values. Periods of macroeconomic weakness or recession, heightened volatility or disruption in the financial and credit markets could increase these risks, potentially resulting in other than temporary impairment of assets in our investment portfolio. Any event reducing the estimated fair value of these securities, other than on a temporary basis, could have a material and adverse effect on our business, results of operations, financial condition, liquidity and cash flows. If our investment manager, fails to react appropriately to difficult market, economic and geopolitical conditions, our investment portfolio could incur material losses.

We have a risk management framework in place to identify, assess and prioritize risks, including the market and credit risks to which our investments are subject. As part of that framework, we test our investment portfolio based on various market scenarios. Under certain stressed market scenarios, unrealized losses on our investment portfolio could lead to material reductions in its carrying value.

A decline in fair value below the amortized cost of a security requires management to assess whether an impairment has occurred. The decision on whether to record an impairment is determined in part by our assessment of the financial condition and prospects of a particular issuer, projections of future cash flows and recoverability of the particular security as well as management’s assertion of whether it is more likely than not that we will sell the particular security before recovery.

Our charter documents and concentration of ownership may hinder or prevent change of control transactions.

Provisions contained in our certificate of incorporation and bylaws may discourage transactions involving an actual or potential change in our ownership. In addition, our Board of Directors may issue shares of common or preferred stock without any further action by the stockholders. Our directors and certain of our institutional investors collectively beneficially own a significant portion of our outstanding common stock. Such provisions and issuances may have the effect of delaying or preventing a change in our ownership. If changes in our ownership are discouraged, delayed or prevented, it would be more difficult for our current Board of Directors to be removed and replaced, even if you or our other stockholders believe that such actions are in the best interests of us and our stockholders.

Our stock price has been volatile and could experience a sudden decline in value.

The market prices for securities of biotechnology and pharmaceutical companies have historically been highly volatile, and the market has recently experienced significant price and volume fluctuations that are unrelated to the operating performance of particular companies. Continued volatility in the overall capital markets could reduce the market price of our common stock in spite of our operating performance. Further, high stock price volatility could result in higher share-based compensation expense.

Our common stock has experienced significant price and volume fluctuations and may continue to experience volatility in the future. Many factors may have a significant impact on the market price of our common stock, including, but not limited to, the following factors: results of or delays in our preclinical studies and clinical trials; the success of our collaboration agreements; publicity regarding actual or potential medical results relating to products under development by us or others; announcements of technological innovations or new commercial products by us or others; developments in patent or other proprietary rights by us or others; comments or opinions by securities analysts or major stockholders or changed securities analysts' reports or recommendations; future sales or shorting of our common stock by existing stockholders; regulatory developments or changes in regulatory guidance; litigation or threats of litigation; economic and other external factors or other disaster or crises; the departure of any of our officers, directors or key employees; period-to-period fluctuations in financial results; and price and volume fluctuations in the overall stock market.

Our results of operations and liquidity needs could be materially negatively affected by market fluctuations and economic downturn.

Our results of operations could be materially negatively affected by economic conditions generally, both in the United States and elsewhere around the world. Concerns over inflation, energy costs, geopolitical issues, public health emergencies, the availability and cost of credit, and the U.S. financial markets have in the past contributed to, and may continue in the future to contribute to, increased volatility and diminished expectations for the economy and the markets. For example, the outbreak of a novel strain of coronavirus has affected the People’s Republic of China and elsewhere and has affected worldwide equity markets. Domestic and international equity markets periodically experience heightened volatility and turmoil. These events may have an adverse effect on us. In the event of a market downturn, our results of operations could be adversely affected by those factors in many ways, including making it more difficult for us to raise funds if necessary, and our stock price may further decline. We cannot provide assurance that our investments are not subject to adverse changes in market value. If our investments experience adverse changes in market value, we may have less capital to fund our operations.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

The following table summarizes our principal facilities leased as of December 31, 2019, including the location and size of each facility, and their designated use. We also lease facilities in other locations. We believe our facilities are adequate for our current and near-term needs, and we will be able to locate additional facilities, as needed.

Location	Approximate Square Feet	Operation	Lease Expiration Date
San Diego, CA	7,000	Corporate headquarters office	June 2023
Emeryville, CA	13,000	Office and laboratory	August 2021
Cambridge, United Kingdom	28,000	Office and laboratory	September 2026

Item 3. Legal Proceedings

See "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (10), Commitments and Contingencies—Legal Proceedings.*"

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

Our common stock is traded on the Nasdaq Global Market under the symbol "LGND." As of February 14, 2020, there were approximately 446 holders of record of the common stock.

Except for 2007, during which we declared a cash dividend on our common stock of $2.50 per share, we have not paid any dividends on our common stock in the past and currently do not expect to pay cash dividends or make any other distributions on common stock in the future. We expect to retain our future earnings, if any, for use in the operation and expansion of our business, to pay down debt and potentially for share repurchases. Any future determination to pay dividends on common stock will be at the discretion of our board of directors and will depend upon our financial condition, results of operations, capital requirements and such other factors as the board deems relevant.

The following table presents information regarding repurchases by us of our common stock during the three months ended December 31, 2019 under the stock repurchase program approved by our board of directors in September 2019, under which we may acquire up to $500 million of our common stock in open market and negotiated purchases for a period of up to three years.

ISSUER PURCHASES OF EQUITY SECURITIES

	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Dollar Value of Shares that May Yet Be Purchased Under the Program (in thousands)
October 1 - October 31, 2019	—	$ —	—	$ 408,730
November 1 - November 30, 2019	625,409	$ 107.74	625,409	$ 341,351
December 1 - December 31, 2019	135,519	$ 107.47	135,519	$ 326,786
Total	760,928	$ 107.69	760,928	

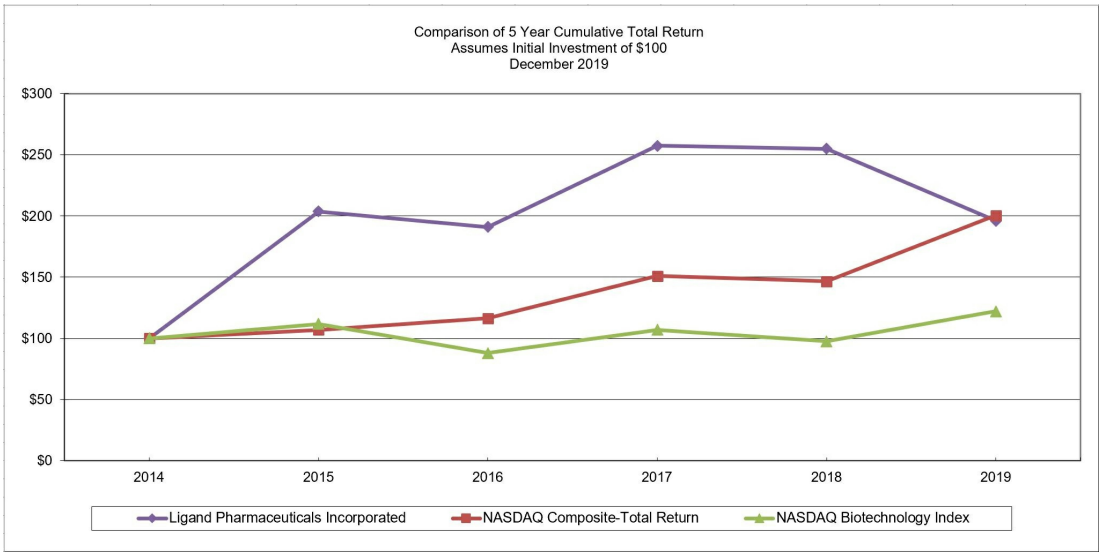
Since December 31, 2019 and as of February 21, 2020, we acquired 405,527 additional shares during 2020, and the maximum dollar value of shares that may yet be purchased under the repurchase program was $290.0 million.

The information required by Item 201(d) of Regulation S-K is incorporated by reference to the 2020 Annual Meeting Proxy Statement as defined in Item 10 below.

Performance Graph

The graph below shows the five-year cumulative total stockholder return assuming the investment of $100 and is based on the returns of the component companies weighted monthly according to their market capitalizations. The graph compares total stockholder returns of our common stock, of all companies traded on the Nasdaq Stock market, as represented by the Nasdaq Composite® Index, and of the Nasdaq Biotechnology Stock Index, as prepared by The Nasdaq Stock Market Inc.

The stockholder return shown on the graph below is not necessarily indicative of future performance and we will not make or endorse any predictions as to future stockholder returns.



Value of $100 Invested Over Time

	12/31/2014	12/31/2015	12/31/2016	12/31/2017	12/31/2018	12/31/2019
Ligand	$ 100.00	$ 203.76	$ 190.96	$ 257.34	$ 255.03	$ 196.00
NASDAQ Composite-Total Return	$ 100.00	$ 106.96	$ 116.45	$ 150.96	$ 146.67	$ 200.49
NASDAQ Biotechnology Index	$ 100.00	$ 111.77	$ 87.91	$ 106.95	$ 97.47	$ 121.94

Item 6. Selected Consolidated Financial Data

The following selected historical consolidated financial and other data are qualified by reference to, and should be read in conjunction with, our consolidated financial statements and the related notes thereto appearing elsewhere herein and "Management's Discussion and Analysis of Financial Condition and Results of Operations." Our selected statement of operations data set forth below for each of the years ended December 31, 2019, 2018, 2017, 2016 and 2015 and the balance sheet data as of December 31, 2019, 2018, 2017, 2016 and 2015 are derived from our consolidated financial statements.

The comparability of the information is affected by a variety of factors, including acquisitions and divestitures of businesses, issuance and repayment of debt, share-based compensation expense, and repurchases of common stock under our stock repurchase programs. In addition, the consolidated statement of operations data for each of the years ended December 31, 2017, 2016 and 2015 and the selected consolidated balance sheet data as of December 31, 2017, 2016 and 2015 set forth in the tables below do not reflect the adoption of Topic 606 and continue to be reported under the standards in effect for those periods. Additionally, the selected consolidated balance sheet data as of December 31, 2018, 2017, 2016 and 2015 set forth in the tables below do not reflect the adoption of Topic 842 regarding leases and continue to be reported under Topic 840 for those periods. The selected consolidated financial data in this section are not intended to replace our consolidated financial statements and related notes. Our historical results are not necessarily indicative of our future results.

	Year Ended December 31,				
	2019	2018	2017	2016	2015
Consolidated Statements of Operations Data:	(in thousands, except per share amounts)				
Royalties	$ 46,976	$ 128,556	$ 88,685	$ 59,423	$ 38,194
Material sales	31,489	29,123	22,070	22,502	27,662
License fees, milestones, and other revenues	41,817	93,774	30,347	27,048	6,058
Total revenues	120,282	251,453	141,102	108,973	71,914
Cost of material sales	11,347	6,337	5,366	5,571	5,807
Amortization of intangibles	16,864	15,792	12,120	10,643	2,375
Research and development	55,908	27,863	26,887	21,221	11,005
General and administrative	41,884	37,734	28,653	27,653	25,398
Total operating costs and expenses	126,003	87,726	73,026	65,088	44,585
Gain from sale of Promacta license	812,797	—	—	—	—
Income from operations	807,076	163,727	68,076	43,885	27,329
Total other income (expense), net	(10,437)	9,603	(10,845)	(35,925)	8,000
Income tax benefit (expense)	(167,337)	(30,009)	(44,675)	(10,327)	192,115
Income (loss) from continuing operations including noncontrolling interests	629,302	143,321	12,556	(2,367)	227,444
Less: Net loss attributable to noncontrolling interests	—	—	—	—	(2,380)
Income (loss) from continuing operations	629,302	143,321	12,556	(2,367)	229,824
Discontinued operations	—	—	—	731	—
Net income (loss)	$629,302	$143,321	$12,556	$(1,636)	$229,824
Basic per share amounts:					
Income (loss) from continuing operations	$ 33.13	$ 6.77	$ 0.60	$ (0.11)	$ 11.61
Discontinued operations	—	—	—	0.04	—
Net income (loss)	$ 33.13	$ 6.77	$ 0.60	$ (0.08)	$ 11.61
Weighted average number of common shares-basic	18,995	21,160	21,032	20,831	19,790
Diluted per share amounts:					
Income (loss) from continuing operations	$ 31.85	$ 5.96	$ 0.53	$ (0.11)	$ 10.83
Discontinued operations	—	—	—	0.04	—
Net income (loss)	$ 31.85	$ 5.96	$ 0.53	$ (0.08)	$ 10.83
Weighted average number of common shares-diluted	19,757	24,067	23,481	20,831	21,228

	December 31,				
	2019	2018	2017	2016	2015
	(in thousands)				
Consolidated Balance Sheet Data:					
Cash, cash equivalents, short-term investments, restricted cash and investments	$ 1,070,597	$ 776,445	$ 208,099	$ 149,393	$ 229,947
Working capital (deficit)	$ 1,106,643	$ 788,291	$ (1,847)	$ (64,076)	$ (8,109)
Total assets	$ 1,494,915	$ 1,260,803	$ 671,021	$ 601,585	$ 503,061
Other long-term obligations (excludes long-term portions of deferred revenue, net and deferred gain)	$ 71,722	$ 7,776	$ 9,981	$ 3,603	$ 3,330
Total notes payable, net (including current portion)	$ 638,959	$ 636,297	$ 224,529	$ 212,910	$ 201,985
Retained earnings (accumulated deficit)	$ 400,105	$ (229,197)	$ (400,924)	$ (431,127)	$ (429,491)
Total stockholders' equity	$ 767,232	$ 560,914	$ 399,788	$ 341,290	$ 237,282

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

Our Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) will help readers understand our results of operations, financial condition, and cash flow. It is provided in addition to the accompanying consolidated financial statements and notes. Comparisons under this heading refer to twelve months ended December 31, 2019 and 2018, respectively, unless otherwise indicated.

Our MD&A is organized as follows:

- *Results of Operations.* Detailed discussion of our revenue and expenses for twelve months ended December 31, 2019 and 2018. A comparison of our results of operations for twelve months ended December 31, 2018 and 2017 can be found under "*Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations*" in our Annual Report on Form 10-K for the fiscal year ended December 31, 2018, filed with the SEC on February 28, 2019.
- *Liquidity and Capital Resources.* Discussion of key aspects of our consolidated statements of cash flows, changes in our financial position, and our financial commitments.
- *Off-Balance Sheet Arrangements.* We have no off-balance sheet arrangements.
- *Contractual Obligations.* Tabular disclosure of known contractual obligations as of December 31, 2019.
- *Critical Accounting Policies and Estimates.* Discussion of significant changes we believe are important to understand the assumptions and judgments underlying our consolidated financial statements.
- *Recent Accounting Pronouncements.* For summary of recent accounting pronouncements applicable to our consolidated financial statements, see "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies.*"

Results of Operations

Revenue

(Dollars in thousands)	2019	2018	Change	% Change
Royalty Revenue	$ 46,976	$ 128,556	$ (81,580)	(63) %
Material Sales	31,489	29,123	2,366	8 %
License fees, milestones and other revenue	41,817	93,774	(51,957)	(55) %
Total revenue	$ 120,282	$ 251,453	$ (131,171)	(52) %

Royalty revenue is a function of our partners' product sales and the applicable royalty rate. Promacta and Kyprolis royalty rates are under a tiered royalty rate structure with the highest being 9.4% and 3.0%, respectively. Evomela has a fixed royalty rate of 20%. On March 6, 2019, we sold all of our rights, title and interest in and to the Promacta license to RPI. Subsequent to March 6, 2019, we no longer recognize revenue related to sales of Promacta. See "*Item 8. Financial Statements and Supplementary Data —Notes to Consolidated Financial Statements—Note (2), Sale of Promacta License.*"

Royalty revenue decreased in 2019 as compared to 2018 driven primarily by the above mentioned sale of the Promacta license in March 2019. Material sales increased year over year in 2019 due to timing of customer purchases of Captisol for use in clinical trials and in commercialized products. The decrease in license fee, milestones and other revenues in 2019 compared to 2018 was primarily driven by a $47.0 million OmniAb platform license fee received from WuXi and $20.0 million received from Roivant upon entering into the GRA license agreement to develop and commercialize RVT-1502 (formerly named LGD-6972) during 2018, partially offset by the additional revenue generated in 2019 from our Vernalis acquisition in October 2018.

The following table represents royalty revenue by program:

(in millions)	2019 Estimated Partner Product Sales	Effective Royalty Rate	2019 Royalty Revenue	2018 Estimated Partner Product Sales	Effective Royalty Rate	2018 Royalty Revenue
Promacta	$ 225.1	6.3%	$ 14.2	$ 1,173.4	8.5%	$ 99.3
Kyprolis	1,095.4	2.3%	25.0	980.5	2.2%	21.7
Evomela	26.0	20.0%	5.2	28.1	20.0%	5.7
Other	194.1	1.3%	2.6	163.5	1.2%	1.9
Total	$ 1,540.6		$ 47.0	$ 2,345.5		$ 128.6

Operating Costs and Expenses

(Dollars in thousands)	2019	2018	Change	% Change
Cost of material sales	$ 11,347	$ 6,337	$ 5,010	79 %
Amortization of intangibles	16,864	15,792	1,072	7 %
Research and development	55,908	27,863	28,045	101 %
General and administrative	41,884	37,734	4,150	11 %
Total operating costs and expenses	$ 126,003	$ 87,726	$ 38,277	44 %

Total operating costs and expenses for 2019 increased $38.3 million or 44% compared with 2018. Cost of material sales increased year over year in 2019 primarily due to higher material sales as a result of timing of customer purchases and mix of Captisol sales in 2019. Amortization of intangibles increased year over year in 2019 primarily due to the acquisitions of Vernalis in October 2018 and Ab Initio in July 2019 as well as $2.7 million of accelerated amortization of the GRA asset due to the unlikelihood of continued program development. Research and development expenses increased year over year in 2019 due to timing of internal development costs, the Vernalis acquisition, and amortization of other economic rights during 2019. General and administrative expenses increased year over year in 2019 primarily due to increased business development activities, an increase in share-based compensation and the Vernalis acquisition.

We do not provide forward-looking estimates of costs and time to complete our ongoing research and development projects as such estimates would involve a high degree of uncertainty. Uncertainties include our inability to predict the outcome of research and clinical studies, regulatory requirements placed upon us by regulatory authorities such as the FDA and EMA, our inability to predict the decisions of our partners, our ability to fund research and development programs, competition from other entities of which we may become aware in future periods, predictions of market potential for products that may be derived from our work, and our ability to recruit and retain personnel or third-party contractors with the necessary knowledge and skills to perform certain research. Refer to "*Item 1A. Risk Factors*" for additional discussion of the uncertainties surrounding our research and development initiatives.

Other income (expense)

(Dollars in thousands)	2019	2018	Change	% Change
Gain (loss) from Viking	$ 2,888	$ 50,187	$ (47,299)	(94) %
Interest income	28,430	13,999	14,431	103 %
Interest expense	(35,745)	(48,276)	12,531	(26) %
Other income (expense), net	(6,010)	(6,307)	297	(5) %
Total other income (expense,) net	$ (10,437)	$ 9,603	$ (20,040)	(209) %

The fluctuation in the gain (loss) from Viking is driven by the changes in the fair value of the Viking common stock and warrants.

Interest income consists primarily of interest earned on our short-term investments. The year over year increase in 2019 was due to the increase in our short-term investment balances as a result of the proceeds from the 2023 Notes financing on May 22, 2018 and the proceeds from the sale of the Promacta license in March 2019.

Interest expense includes the 0.75% coupon cash interest expense in addition to the non-cash accretion of discount (including the amortization of debt issuance costs) on our 2019 Notes and 2023 Notes. The year over year decrease in 2019 was primarily due to lower average debt outstanding balance as compared to the prior year. The 2019 Notes were paid off upon the maturity date in August 2019. See "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (7), Convertible Senior Notes.*"

Other income (expense), net, for the twelve months ended December 31, 2019, consists primarily of a $5.1 million reduction in the value of our Selexis commercial license right. See additional information in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies - Commercial License and Other Economic Rights.*" Other income (expense), net, for the twelve months ended December 31, 2018, consists primarily of changes in the fair value of contingent liabilities associated with our Crystal and Metabasis acquisitions and net changes in derivative instrument expense associated with our convertible notes and bond hedge transactions. See additional information in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (7), Convertible Senior Notes.*"

Income tax expense

(Dollars in thousands)	2019	2018	Change	% Change
Income before income tax expense	$ 796,639	$ 173,330	$ 623,309	360 %
Income tax expense	(167,337)	(30,009)	(137,328)	458 %
Income from operations	$ 629,302	$ 143,321	$ 485,981	339 %
Effective Tax Rate	21 %	17 %		

Our effective tax rate for 2019 and 2018 was 21% and 17%, respectively. Our tax rate is affected by recurring items, such as the U.S. federal and state statutory tax rates and the relative amounts of income we earn in those jurisdictions, which we expect to be fairly consistent in the near term. It is also affected by discrete items that may occur in any given year, but are not consistent from year to year. In addition to state income taxes, the items below had the most significant impact on the difference between our statutory U.S. income tax rate and our effective tax rate.

2019

- $1.2 million (0.1%) decrease due to the release of a valuation allowance primarily relating to research and development tax credits.
- $0.9 million (0.1%) decrease from research and development tax credits
- $0.8 million (0.1%) decrease due to excess tax benefits from share-based compensation which are recorded as a discrete item within the provision for income tax pursuant to ASU 2016-09

2018

- $8.1 million (5%) decrease due to excess tax benefits from share-based compensation which are recorded as a discrete item within the provision for income tax pursuant to ASU 2016-09

- $4.2 million (2%) decrease due to changes in valuation allowance primarily relating to capital loss carryovers and research and development tax credits.
- $3.1 million (2%) increase from expired NOLs and credits
- $2.8 million (2%) reduction from research and development tax credits
- $0.9 million (1%) increase from non-cash contingent consideration charges that are nondeductible for tax purposes
- $0.9 million (1%) increase from Section 162(m) limitation

Liquidity and Capital Resource

At December 31, 2019, we had approximately $1,011.5 million in cash, cash equivalents, and short-term investments, of which approximatey $6.8 million was held by our foreign subsidiaries. Cash and cash equivalents and short-term investments increased by $293.2 million from last year, due to factors described in the "Cash Flow Summary" below. Our primary source of liquidity, other than our holdings of cash, cash equivalents, and investments, which increased during 2019 primarily from the sale of the Promacta license, has been cash flows from operations. Our ability to generate cash from operations provides us with the financial flexibility we need to meet operating, investing, and financing needs.

Historically, we have liquidated our short-term investments and/or issued debt and equity securities to finance our business needs as a supplement to cash provided by operating activities. Our short-term investments include U.S. government debt securities, investment-grade corporate debt securities, mutual funds and certificates of deposit. We have established guidelines relative to diversification and maturities of our investments in order to provide both safety and liquidity. These guidelines are periodically reviewed and modified to take advantage of trends in yields and interest rates. Additionally, we own certain securities which are classified as short-term investments that we received as a result of a milestone and an upfront license payment as well as 6.0 million shares of common stock in Viking.

In August 2014, we issued the 2019 Notes with aggregate principal amount of $245.0 million. During 2018, $217.7 million in principal of the 2019 Notes were converted into cash. In June 2019, we received notices for conversion of $1.0 million of principal amount of the 2019 Notes, which were settled in cash upon the 2019 Notes' maturity date in August 2019. On August 15, 2019, the 2019 Notes maturity date, we paid the noteholders the remaining $26.3 million principal amount.

In May 2018, we issued the 2023 Notes with an aggregate principal amount of $750.0 million. A portion of the proceeds from such issuance totaling $49.7 million were used to repurchase 260,000 shares of our common stock. The 2023 Notes were not convertible as of December 31, 2019. It is our intent and policy to settle conversions through combination settlement, which essentially involves payment in cash equal to the principal portion and delivery of shares of common stock for the excess of the conversion value over the principal portion. See detail in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (7), Convertible Senior Notes.*"

In September 2018, our Board of Directors authorized us to repurchase up to $200.0 million of our common stock from time to time over a period of up to three years. On January 23, 2019, our Board of Directors increased the share repurchase authorization by $150.0 million. The available amount under the $350.0 million repurchase plan was fully utilized during the third quarter of 2019.

On September 11, 2019, our Board of Directors approved a stock repurchase program authorizing the repurchase of up to $500.0 million of our common stock from time to time over the next three years. We expect to acquire shares primarily through open-market transactions and have entered into a Rule 10b5-1 trading plan, and may enter into additional Rule 10b5-1 trading plans in the future, to facilitate open-market repurchases. The timing and amount of repurchase transactions will be determined by management based on our evaluation of market conditions, share price, legal requirements and other factors. Our prior $350.0 million stock repurchase program mentioned above was terminated in connection with the approval of the new stock repurchase program. Authorization to repurchase $326.8 million of our common stock remained available as of December 31, 2019. See *"Item 5. Market for Registrant's Common Equity, Related Stockholder Matters, and Issuer Purchase of Equity Securities*"

We believe that existing funds, cash generated from operations and existing sources of and access to financing are adequate to satisfy our needs for working capital; capital expenditure and debt service requirements; continued advancement of research and development efforts; potential stock repurchases; and other business initiatives we plan to strategically pursue, including acquisitions and strategic investments.

As of December 31, 2019, we had $8.9 million in fair value of contingent consideration liabilities associated with prior acquisitions to be settled in future periods.

Cash Flow Summary

(in thousands)	2019	2018	2017
Net cash provided by (used in):			
Operating activities	$ (29,336)	$ 194,059	$ 88,570
Investing activities	$ 466,918	$ (423,269)	$ (79,179)
Financing activities	$ (485,172)	$ 328,585	$ (7,523)

In 2019, we generated $827 million from the sale of the Promacta license (including $14.2 million recorded to revenue related to the Promacta royalty for the period between January 1, 2019 and March 6, 2019), used cash for net purchases of short-term investments, used $453.0 million to repurchase our common stock, used $103.8 million to pay federal and state estimated income taxes, paid off the remaining balance of the 2019 Notes in the amount of $27.3 million, paid $12.0 million for the purchase of Novan economic rights and paid $11.8 million for the Ab Initio acquisition (net of cash acquired).

In 2018, we generated cash from operations, from issuance of the 2023 Notes and associated warrants, and from issuance of common stock under employee stock plans. During the same period we used cash for investing activities, including the acquisition of commercial rights, net purchases of short-term investments, payments made to acquire Vernalis, payments to CVR holders and capital expenditures. We also used cash for financing activities, including principal payments related to conversions of the 2019 Notes, payments to purchase the bond hedge associated with the 2023 Notes, payments for taxes related to net share settlement of equity awards and to repurchase shares of our common stock.

In 2017, we generated cash from operations and from issuance of common stock under employee stock plans. During the same period we used cash for investing activities, including net purchases of short-term investments, payments made to acquire Crystal, payments to CVR holders and capital expenditures. We also used cash to pay taxes related to net share settlement of equity awards and to repurchase shares of our common stock.

Off-Balance Sheet Arrangements

We do not participate in any transactions that generate relationships with unconsolidated entities or financial partnerships, such as entities often referred to as structured finance or special purpose entities, which would have been established for the purpose of facilitating off-balance sheet arrangements or other contractually narrow or limited purposes. During the fiscal year ended December 31, 2019, we were not involved in any “off-balance sheet arrangements” within the meaning of the rules of the SEC.

We lease our office facilities under operating lease arrangements with varying terms through September 2026. The agreements provide for increases in annual rents based on changes in the Consumer Price Index or fixed percentage increases of 3.0%. We had no off-balance sheet arrangements at December 31, 2019, 2018 and 2017.

Contractual Obligations

As of December 31, 2019, future minimum payments due under our contractual obligations are as follows (in thousands):

	Payments Due by Period				
	Total	Less than 1 year	1-2 years	3-4 years	Thereafter
Purchase obligations [1]	$ 19,646	$ 12,139	$ 7,507	$ —	$ —
Notes payable [2]	$ 769,219	$ 5,625	$ 11,250	$ 752,344	$ —
Operating lease obligations [3]	$ 13,866	$ 1,914	$ 4,482	$ 3,977	$ 3,493

Amounts represent our commitments under our supply agreement with Hovione for Captisol purchases.
Amounts represent contractual amounts due under our 2023 Notes, including interest based on the fixed rate of 0.75% per year.

We lease an office facility, which we have fully vacated under operating lease arrangements expiring on February 2023. We sublet the facility through the end of our lease. As of December 31, 2019, we expect to receive aggregate future minimum lease payments totaling $0.9 million (non-discounted) over the duration of the sublease agreement, which are not included in the table above.

Critical Accounting Policies and Estimates

The preparation of financial statements in conformity with GAAP requires estimates and assumptions that affect the reported amounts of assets and liabilities, revenues and expenses, and related disclosures of contingent liabilities in the consolidated financial statements and accompanying notes. The SEC has defined a company's critical accounting policies as the ones that are most important to the portrayal of the company's financial condition and results of operations, and which require the company to make its most difficult and subjective judgments, often as a result of the need to make estimates of matters that are inherently uncertain. Based on this definition, we have identified the critical accounting policies and judgments addressed below. We also have other key accounting policies, which involve the use of estimates, judgments, and assumptions that are significant to understanding our results. For additional information, see "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies*." Although we believe that our estimates, assumptions, and judgments are reasonable, they are based upon information presently available. Actual results may differ significantly from these estimates under different assumptions, judgments, or conditions.

Revenue Recognition

On January 1, 2018, we adopted ASC 606, which amends the guidance for recognition of revenue from contracts with customers using the modified-retrospective method applied to those contracts that were not completed as of January 1, 2018. We apply the following five-step model in order to determine the revenue: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations, including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations; and (v) recognition of revenue when (or as) the Company satisfies each performance obligation.

We receive royalty revenue on sales by our partners of products covered by patents that we or our partners own under the contractual agreements. We do not have future performance obligations under these license arrangements. We generally satisfy our obligation to grant intellectual property rights on the effective date of the contract. However, we apply the royalty recognition constraint required under the guidance for sales-based royalties which requires a sales-based royalty to be recorded no sooner than the underlying sale. Therefore, royalties on sales of products commercialized by our partners are recognized in the quarter the product is sold. Our partners generally report sales information to us on a one quarter lag. Thus, we estimate the expected royalty proceeds based on an analysis of historical experience and interim data provided by our partners including their publicly announced sales. Differences between actual and estimated royalty revenues are adjusted for in the period in which they become known, typically the following quarter.

Our contracts with customers often will include future contingent milestone based payments. We include contingent milestone based payments in the estimated transaction price when it is probable to estimate the amount of the payment. These estimates are based on historical experience, anticipated results and our best judgment at the time. If the contingent milestone based payment is sales-based, we apply the royalty recognition constraint and record revenue when the underlying sale has taken place. Significant judgments must be made in determining the transaction price for our sales of intellectual property. Because of the risk that products in development with our partners will not reach development based milestones or receive regulatory approval, we generally recognize any contingent payments that would be due to us upon the development milestone or regulatory approval. Depending on the terms of the arrangement, we may also defer a portion of the consideration received because we have to satisfy a future obligation. We use an observable price to determine the stand-alone selling price for separate performance obligations or a cost plus margin approach when one is not available.

For R&D services that we recognize over time, we measure our progress using an input method. The input methods we use are based on the effort we expend or costs we incur toward the satisfaction of our performance obligation. We estimate the amount of effort we expend, including the time we estimate it will take us to complete the activities, or costs we incur in a given period, relative to the estimated total effort or costs to satisfy the performance obligation. This results in a percentage that we multiply by the transaction price to determine the amount of revenue we recognize each period. This approach requires us to make numerous estimates and use significant judgement. If our estimates or judgements change over the course of the collaboration, they may affect the timing and amount of revenue that we recognize in the current and future periods.

Revenue from material sales is recognized when control of Captisol material or intellectual property license rights is transferred to our customers in an amount that reflects the consideration we expect to receive from our customers in exchange for those products. This process involves identifying the contract with a customer, determining the performance obligations in the contract, determining the contract price, allocating the contract price to the distinct performance obligations in the contract, and recognizing revenue when the performance obligations have been satisfied. A performance obligation is considered distinct from other obligations in a contract when it provides a benefit to the customer either on its own or together with other resources that are readily available to the customer and is separately identified in the contract. We consider a performance obligation satisfied once we have transferred control of the product, meaning the customer has the ability to use and obtain the benefit of the Captisol material or intellectual property license right. We recognize revenue for satisfied performance obligations only when we determine there are no uncertainties regarding payment terms or transfer of control. Sales tax and other taxes we collect concurrent with revenue-producing activities are excluded from revenue. We have elected to recognize the cost for freight and shipping when control over Captisol material has transferred to the customer as an expense in cost of material sales. We expense incremental costs of obtaining a contract when incurred if the expected amortization period of the asset that we would have recognized is one year or less or the amount is immaterial. We did not incur any incremental costs of obtaining a contract during the periods reported.

We occasionally have sub-license obligations related to arrangements for which we receive license fees, milestones and royalties. We evaluate the determination of gross as a principal versus net as an agent reporting based on each individual agreement.

Intangible Assets and Other Long-Lived Assets — Impairment Assessments

We regularly perform reviews to determine if the carrying values of our long-lived assets are impaired. A review of identifiable intangible assets and other long-lived assets is performed when an event occurs indicating the potential for impairment. If indicators of impairment exist, we first assess the impairment evaluation and then assess the recoverability of the affected long-lived assets and compare their fair values to the respective carrying amounts if needed. An impairment evaluation is based on an undiscounted cash flow analysis at the lowest level at which cash flows of the long-lived assets are largely independent of other groups of assets and liabilities.

In order to estimate the fair value of identifiable intangible assets and other long-lived assets, we estimate the present value of future cash flows from those assets. The key assumptions that we use in our discounted cash flow model are the amount and timing of estimated future cash flows to be generated by the asset over an extended period of time and a rate of return that considers the relative risk of achieving the cash flows, the time value of money, and other factors that a willing market participant would consider. Significant judgment is required to estimate the amount and timing of future cash flows and the relative risk of achieving those cash flows.

Assumptions and estimates about future values and remaining useful lives are complex and often subjective. They can be affected by a variety of factors, including external factors such as industry and economic trends, and internal factors such as changes in our business strategy and our internal forecasts. For example, if our future operating results do not meet current forecasts or if we experience a sustained decline in our market capitalization that is determined to be indicative of a reduction in fair value of our reporting unit, we may be required to record future impairment charges for purchased intangible assets. Impairment charges could materially decrease our future net income and result in lower asset values on our balance sheet.

Contingent Liabilities

In October 2017, we acquired Crystal for total cash consideration of $27.2 million, plus contingent consideration of up to an additional $10.5 million over a five year period following the acquisition date based on certain research milestones and a portion of the payments that we receive from a specified part of the historical Crystal business. The contingent consideration is measured at fair value using an income approach valuation technique, specifically with probability weighted and discounted cash flows. The fair value of the liability is assessed at each reporting date and the change in fair value is recorded in our consolidated statements of operations. The carrying amount of the liability may fluctuate significantly and actual amounts paid may be materially different than the carrying amount of the liability. The fair value of the contingent consideration liability as of December 31, 2019 was $2.7 million.

In connection with our acquisition of Metabasis in January 2010, we issued Metabasis stockholders four tradable CVRs, one CVR from each of four respective series of CVR, for each Metabasis share. The CVRs entitle Metabasis stockholders to cash payments as proceeds are received by us from the sale or partnering of any of the Metabasis drug development programs. The fair values of the CVRs are remeasured at each reporting date through the term of the related agreement. Changes in the fair values are reported in the statement of operations as income (decreases) or expense (increases). The carrying amount of the

liability may fluctuate significantly based upon quoted market prices and actual amounts paid under the agreements may be materially different than the carrying amount of the liability.

See additional information in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (5), Fair Value Measurement.*"

Income Taxes

Our provision for income taxes, deferred tax assets and liabilities, and reserves for unrecognized tax benefits reflect our best assessment of estimated future taxes to be paid. Significant judgments and estimates based on interpretations of existing tax laws or regulations in the United States are required in determining our provision for income taxes. Changes in tax laws, statutory tax rates, and estimates of our future taxable income could impact the deferred tax assets and liabilities provided for in the consolidated financial statements and would require an adjustment to the provision for income taxes.

Deferred tax assets are regularly assessed to determine the likelihood they will be recovered from future taxable income. A valuation allowance is established when we believe it is more likely than not the future realization of all or some of a deferred tax asset will not be achieved. In evaluating our ability to recover deferred tax assets within the jurisdiction which they arise, we consider all available positive and negative evidence. Factors reviewed include the cumulative pre-tax book income for the past three years, scheduled reversals of deferred tax liabilities, our history of earnings and reliability of our forecasts, projections of pre-tax book income over the foreseeable future, and the impact of any feasible and prudent tax planning strategies.

We recognize the impact of a tax position in our financial statements only if that position is more likely than not of being sustained upon examination by taxing authorities, based on the technical merits of the position. Tax authorities regularly examine our returns in the jurisdictions in which we do business and we regularly assess the tax risk of our return filing positions. Due to the complexity of some of the uncertainties, the ultimate resolution may result in payments that are materially different from our current estimate of the tax liability. These differences, as well as any interest and penalties, will be reflected in the provision for income taxes in the period in which they are determined.

Recent Accounting Pronouncements

For the summary of recent accounting pronouncements applicable to our consolidated financial statements, see "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies.*"

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risk from interest rates and equity prices which could affect our results of operations, financial condition and cash flows. We manage our exposure to these market risks through our regular operating and financing activities.

Investment Portfolio Risk

At December 31, 2019, our investment portfolio included investments in available-for-sale securities of $940.0 million and investment in Viking common stock and warrants of $58.3 million. These securities are subject to market risk and may decline in value based on market conditions.

Equity Price Risk

In order to minimize the impact of potential dilution to our common stock upon the conversion of our then-existing 2019 Notes, we entered into convertible bond hedges covering 3,264,643 shares of our common stock. Concurrently with entering into the convertible bond hedge transactions, we entered into warrant transactions whereby we sold warrants with an exercise price of approximately $125.08 per share, subject to adjustment. The warrants have various expiration dates ranging from November 13, 2019 to April 22, 2020. The warrants will have a dilutive effect to the extent the market price per share of common stock exceeds the applicable exercise price of the warrants, as measured under the terms of the warrant transactions. We continue to have the ability to avoid settling the warrants associated with the 2019 Notes in cash after May 22, 2018. In November 2018, we repurchased a total of 525,000 warrants. As of December 31, 2019, 849,292 warrants had expired, and 1,890,359 warrants remained outstanding.

Our 2023 Notes include conversion and settlement provisions that are based on the price of our common stock at conversion or maturity of the notes, as applicable. As of December 31, 2019, the "if-converted value" did not exceed the principal amount of the 2023 Notes. See detail in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (7), Convertible Senior Notes.*"

Foreign Currency Risk

Through our licensing and business operations, together with our recent acquisition of Vernalis, we are exposed to foreign currency risk. Foreign currency exposures arise from transactions denominated in a currency other than the functional currency and from foreign denominated revenues and profit translated into U.S. dollars. Our license partners sell our products worldwide in currencies other than the U.S. dollar. Because of this, our revenues from royalty payments are subject to risk from changes in exchange rates.

We purchase Captisol from Hovione, located in Lisbon, Portugal. Payments to Hovione are denominated and paid in U.S. dollars; however, the unit price of Captisol contains an adjustment factor which is based on the sharing of foreign currency risk between the two parties. The effect of an immediate 10% change in foreign exchange rates would not have a material impact on our financial condition, results of operations or cash flows. We do not currently hedge our exposures to foreign currency fluctuations.

Interest Rate Risk

We are exposed to changes in interest rates related primarily to our investment portfolio. Our investment policy and strategy are focused on the preservation of capital and supporting our liquidity requirements. We use a combination of internal and external management to execute our investment strategy. We typically invest in highly rated securities, with the primary objective of minimizing the risk of principal loss. Our investment policy generally requires securities to be investment grade and limits the amount of credit exposure to any one issuer. We have historically maintained a relatively short average maturity for our investment portfolio, and we believe a hypothetical 100 basis point adverse move in interest rates across all maturities would not materially impact the fair market value of the portfolio in either period.

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

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Ligand Pharmaceuticals Incorporated

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Ligand Pharmaceuticals Incorporated (the Company) as of December 31, 2019 and 2018, and the related consolidated statements of operations, comprehensive income , stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes, (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 27, 2020 expressed an unqualified opinion thereon.

Adoption of ASU No. 2016-02

As discussed in Note 1 to the consolidated financial statements, the Company changed its method of accounting for leases in 2019 due to the adoption of Accounting Standards Update (ASU) No. 2016-02, *Leases (Topic 842)*, and the related amendments.

Adoption of ASU No. 2014-09

As discussed in Note 1 to the consolidated financial statements, the Company changed its method of accounting for recognizing revenue due to the adoption of Accounting Standards Update (ASU) 2014-09, R*evenue from Contracts with Customers (Topic 606)*, and the amendments in ASUs 2015-14, 2016-10, and 2016-12, effective January 1, 2018.

Adoption of ASU No. 2016-01

As discussed in Note 3 to the consolidated financial statements, the Company changed its method of accounting for financial instruments due to the adoption of Accounting Standards Update (ASU) 2016-01, *Financial Instruments- Recognition and Measurement of Financial Assets and Financial Liabilities*, effective January 1, 2018.

Basis for Opinion

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

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

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that

are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of the 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 a separate opinion on the critical audit matters or on the account or disclosure to which they relate.

Uncertain Tax Positions

Description of the Matter

As discussed in Note 11 to the consolidated financial statements, the Company had unrecognized income tax benefits of $29 million related to its uncertain tax positions at December 31, 2019. The Company uses judgment to (1) determine whether, based on the technical merits, a tax position is more likely than not to be sustained and (2) measure the amount of tax benefit that qualifies for recognition. Estimated tax benefits related to uncertain tax positions that are not more likely than not to be sustained are reported as unrecognized income tax benefits.

Auditing management's analysis of the Company's uncertain tax positions and the amount of recognized tax benefit is complex and involves judgment because management's estimate is based upon interpretations of tax laws, and legal rulings.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design, and tested the operating effectiveness of the Company's controls over the Company's accounting process related to uncertain tax positions. For example, we tested controls over management's identification of uncertain tax positions and its application of the recognition and measurement principles, including management's review of the inputs and calculations of recognized tax benefits.

Our audit procedures included, among others, testing the completeness and accuracy of the underlying data used by the Company to determine its uncertain tax positions. We involved our tax professionals to assess the technical merits of the Company's tax positions including its consideration of relevant tax laws and current interpretations. In addition, we compared the estimated liabilities for unrecognized income tax benefits to similar positions in prior periods and assessed the historical accuracy of management's estimates of its uncertain tax positions by comparing the estimates with the resolution of those positions as applicable. We also evaluated the adequacy of the Company's disclosures included in Note 11 in relation to these tax matters.

Gain from sale of Promacta license

Description of the Matter

As discussed in Note 2 to the consolidated financial statements, on March 6, 2019 the Company sold the Promacta-related rights, title and interest in and to intellectual property and related know-how for $827 million in cash. Of the total cash proceeds from the sale, $14.2 million was recorded as revenue related to the Promacta royalty for the period between January 1, 2019 and March 6, 2019, and the remaining $812.8 million was recorded to income from operations in accordance with ASC 610-20, Other Income - Gains and Losses from the Derecognition of Nonfinancial Assets.

Auditing the sale of Promacta license was especially challenging as the transaction was highly complex and the conclusions involved interpretation of complex accounting standards. This transaction required the exercise of auditor judgment in evaluating management's determination of when control passed to the customer.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of the controls over management's process for evaluating the transaction. For example, we tested controls over management's review of the technical assessment over the asset sale.

Our auditing procedures included, among others, obtaining and reading the agreements relating to the Promacta license sale and related documentation to evaluate the Company's accounting conclusions. We performed procedures to test whether the terms of the agreement transferred all technology, rights and materials to the counter party. We vouched proceeds of the sale and that all obligations had been satisfied as of the transaction date.

/s/ Ernst & Young LLP

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

San Diego, California
February 27, 2020

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED BALANCE SHEETS
(in thousands, except par value)

	December 31,	
	2019	**2018**
ASSETS		
Current assets:		
Cash and cash equivalents	$ 71,543	$ 117,164
Short-term investments	939,989	601,217
Investment in Viking	58,335	55,448
Accounts receivable, net	30,387	55,850
Inventory	7,296	7,124
Derivative asset	—	22,576
Income taxes receivable	11,361	142
Other current assets	4,734	11,019
Total current assets	1,123,645	870,540
Deferred income taxes, net	25,608	46,521
Intangible assets, net	210,448	219,793
Goodwill	95,229	86,646
Commercial license and other economic rights	20,090	31,460
Property and equipment, net	7,185	5,372
Operating lease right-of-use assets	10,353	—
Other assets	2,357	471
Total assets	$ 1,494,915	$ 1,260,803
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 2,420	$ 4,183
Accrued liabilities	9,836	19,200
Current contingent liabilities	2,607	5,717
Deferred revenue	2,139	3,286
Derivative liability	—	23,430
2019 convertible senior notes, net	—	26,433
Total current liabilities	17,002	82,249
2023 convertible senior notes, net	638,959	609,864
Long-term contingent liabilities	6,335	6,825
Deferred income taxes, net	32,937	—
Long-term operating lease liabilities	9,970	—
Other long-term liabilities	22,480	951
Total liabilities	727,683	699,889
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, $0.001 par value; 5,000 shares authorized; zero issued and outstanding at December 31, 2019 and 2018	—	—
Common stock, $0.001 par value; 60,000 shares authorized; 16,823 and 20,766 shares issued and outstanding at December 31, 2019 and 2018, respectively	17	21
Additional paid-in capital	367,326	791,114
Accumulated other comprehensive loss	(216)	(1,024)
Retained earnings (accumulated deficit)	400,105	(229,197)
Total stockholders' equity	767,232	560,914
Total liabilities and stockholders' equity	$ 1,494,915	$ 1,260,803

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except per share amounts)

	Year Ended December 31,		
	2019	**2018**	**2017**
Revenues:			
Royalties	$ 46,976	$ 128,556	$ 88,685
Material sales	31,489	29,123	22,070
License fees, milestones and other revenues	41,817	93,774	30,347
Total revenues	120,282	251,453	141,102
Operating costs and expenses:			
Cost of material sales	11,347	6,337	5,366
Amortization of intangibles	16,864	15,792	12,120
Research and development	55,908	27,863	26,887
General and administrative	41,884	37,734	28,653
Total operating costs and expenses	126,003	87,726	73,026
Gain from sale of Promacta license	812,797	—	—
Income from operations	807,076	163,727	68,076
Other income (expense):			
Gain (loss) from Viking	2,888	50,187	(2,048)
Interest income	28,430	13,999	2,060
Interest expense	(35,745)	(48,276)	(13,460)
Other income (expense), net	(6,010)	(6,307)	2,603
Total other income (expense), net	(10,437)	9,603	(10,845)
Income before income tax expense	796,639	173,330	57,231
Income tax expense	(167,337)	(30,009)	(44,675)
Net income	629,302	143,321	12,556
Basic net income per share	$ 33.13	$ 6.77	$ 0.60
Shares used in basic per share calculation	18,995	21,160	21,032
Diluted net income per share	$ 31.85	$ 5.96	$ 0.53
Shares used in diluted per share calculation	19,757	24,067	23,481

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(in thousands)

	Year Ended December 31,		
	2019	**2018**	**2017**
Net income	$ 629,302	$ 143,321	$ 12,556
Unrealized net gain on available-for-sale securities, net of tax	200	73	143
Foreign currency translation	608	(921)	—
Less: Reclassification of net realized gains included in net income, net of tax	—	—	(400)
Comprehensive income	$ 630,110	$ 142,473	$ 12,299

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED STATEMENT OF STOCKHOLDERS' EQUITY

(in thousands, except share data)

	Common Stock		Additional paid-in capital	Accumulated other comprehensive income (loss)	Accumulated deficit	Total stockholders' equity
	Shares	Amount				
Balance at January 1, 2017	20,909,301	$ 21	$ 769,653	$ 2,743	$ (431,127)	$ 341,290
Issuance of common stock under employee stock compensation plans, net	253,364	—	(5,558)	—	—	(5,558)
Reclassification of equity component of currently redeemable convertible notes	—	—	10,704	—	—	10,704
Share-based compensation	—	—	24,916	—	—	24,916
Repurchase of common stock	(14,000)	—	(1,966)	—	—	(1,966)
Other comprehensive loss	—	—	—	(257)	—	(257)
Cumulative-effect adjustment from adoption of ASU 2016-09	—	—	456	—	17,647	— 18,103
Net income	—	—	—	—	12,556	12,556
Balance at December 31, 2017	21,148,665	$ 21	$ 798,205	$ 2,486	$ (400,924)	$ 399,788
Issuance of common stock under employee stock compensation plans, net	399,116	—	16,417	—	—	16,417
Reclassification of equity component of currently redeemable convertible notes	—	—	18,859	—	—	18,859
Share-based compensation	—	—	20,846	—	—	20,846
Repurchase of common stock	(782,248)	—	(127,481)	—	—	(127,481)
Other comprehensive income	—	—	—	73	—	73
Cumulative-effect adjustment from adoption of ASU 2016-01	—	—	—	(2,662)	2,662	—
Cumulative-effect adjustment from adoption of ASU 2014-09, net of tax	—	—	—	—	25,581	25,581
Derivative associated with 2019 Notes and Bond Hedge	—	—	(1,559)	—	—	(1,559)
Loss on settlement of 2019 Notes	—	—	3,187	—	—	3,187
Warrant repurchase in connection with 2019 Notes	—	—	(30,472)	—	—	(30,472)
Loss on repurchase of warrants in connection with 2019 Notes	—	—	1,792	—	—	1,792
Tax effect on 2019 Notes transactions	—	—	(1,680)	—	—	(1,680)
Derivative associated with 2023 Notes and Bond Hedge	—	—	(1,807)	—	—	(1,807)
Warrant derivative in connection with 2023 Notes	—	—	97,805	—	—	97,805
Tax effect for 2023 Notes transactions	—	—	(3,181)	—	—	(3,181)
Foreign currency translation adjustment	—	—	—	(921)	—	(921)
Other tax adjustments	—	—	183	—	163	346
Net income	—	—	—	—	143,321	143,321
Balance at December 31, 2018	20,765,533	$ 21	$ 791,114	$ (1,024)	$ (229,197)	$ 560,914
Issuance of common stock under employee stock compensation plans, net	179,838	—	(1,421)	—	—	(1,421)
Share-based compensation	—	—	24,515	—	—	24,515
Repurchase of common stock	(4,122,133)	(4)	(448,429)	—	—	(448,433)
Unrealized net gain on available-for-sale securities, net of deferred tax	—	—	—	200	—	200
Foreign currency translation adjustment	—	—	—	608	—	608
Other tax adjustments	—	—	1,547	—	—	1,547
Net income	—	—	—	—	629,302	629,302
Balance at December 31, 2019	16,823,238	$ 17	$ 367,326	$ (216)	$ 400,105	$ 767,232

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

	Year Ended December 31,		
	2019	**2018**	**2017**
Operating activities			
Net income	$ 629,302	$ 143,321	$ 12,556
Adjustments to reconcile net income to net cash provided by (used in) operating activities:			
Gain from sale of Promacta license	(812,797)	—	—
Change in estimated fair value of contingent liabilities	(30)	3,448	2,580
Realized gain on sale of short-term investment	(41)	(2,611)	(831)
Depreciation and amortization of intangible assets	18,361	12,784	10,955
(Gain) loss on equity investment in Viking	(2,888)	(47,658)	(1,114)
Amortization/accretion of premium (discount) on investments, net	(10,274)	(5,452)	(81)
Amortization of debt discount and issuance fees	29,988	43,954	11,619
Amortization of commercial license and other economic rights	25,370	1,934	759
Share-based compensation	24,515	20,846	24,915
Deferred income taxes, net	74,829	29,739	44,518
Royalties recorded in retained earnings upon adoption of ASC 606	—	32,707	—
Other	(1,456)	2,832	(870)
Changes in operating assets and liabilities, net of acquisitions:			
Accounts receivable, net	25,463	(29,544)	(8,358)
Inventory	(2,061)	(2,559)	(843)
Accounts payable and accrued liabilities	(6,826)	(4,542)	(1,713)
Income taxes receivable	(11,219)	318	(460)
Other economic rights	(12,000)	—	—
Other	2,428	(5,458)	(5,062)
Net cash provided by (used in) operating activities	(29,336)	194,059	88,570
Investing activities			
Proceeds from sale of Promacta license	812,797	—	—
Purchase of commercial license rights	—	(10,000)	—
Cash paid for acquisition, net of cash acquired	(11,840)	(5,856)	(26,653)
Purchases of property and equipment	(2,553)	(887)	(2,156)
Purchases of short-term investments	(2,356,545)	(1,434,255)	(254,258)
Proceeds from sale of short-term investments	535,877	131,942	86,985
Proceeds from maturity of short-term investments	1,494,851	892,873	109,649
Proceeds from commercial license rights	—	—	7,054
Proceeds received from repayment of Viking note receivable	—	3,914	200
Cash paid for equity method investment	(1,000)	—	—
Other, net	(4,669)	(1,000)	—
Net cash provided by (used in) investing activities	466,918	(423,269)	(79,179)
Financing activities			
Repayment of debt	(27,323)	(217,674)	—
Gross proceeds from issuance of 2023 Convertible Senior Notes	—	750,000	—
Payment of debt issuance costs	—	(16,900)	—
Proceeds from issuance of warrants	—	90,000	—
Purchase of convertible bond hedge	—	(140,250)	—
Proceeds from bond hedge settlement	12,401	439,559	—
Payments to convert holders for bond conversion	(12,401)	(439,581)	—
Net proceeds from stock option exercises and ESPP	2,997	20,183	4,517
Taxes paid related to net share settlement of equity awards	(4,418)	(3,765)	(10,074)
Share repurchases	(453,048)	(122,868)	(1,966)
Repurchase of warrants	(380)	(30,094)	—
Payments to CVR Holders	(3,000)	(25)	—

Net cash provided by (used in) financing activities	(485,172)	328,585	(7,523)
Net increase (decrease) in cash and cash equivalents	(47,590)	99,375	1,868
Effect of exchange rate changes on cash	83	(215)	—
Cash, cash equivalents and restricted cash at beginning of year	119,780	20,620	18,752
Cash, cash equivalents and restricted cash at end of year	$ 72,273	119,780	20,620
Supplemental disclosure of cash flow information			
Cash paid during the year:			
Interest paid	$ 5,827	$ 1,513	$ 1,838
Taxes paid	$ 103,817	$ 341	$ 157
Restricted cash in other current assets	$ 730	$ 2,616	$ —
Supplemental schedule of non-cash investing and financing activities			
Accrued inventory purchases	$ 170	$ 2,059	$ 1,007
Unrealized gain on AFS investments	$ 256	$ 48	$ 144
Purchase of fixed assets recorded in accounts payable	$ 495	$ 15	$ —

See accompanying notes to these consolidated financial statements.

Unless the context requires otherwise, references in this report to "Ligand," "we," "us," the "Company," and "our" refer to Ligand Pharmaceuticals Incorporated and its consolidated subsidiaries.

1. Basis of Presentation and Summary of Significant Accounting Policies

Business

We are a biopharmaceutical company with a business model primarily based on developing or acquiring assets which generate royalty, milestone or other passive revenue for us using a lean corporate cost structure. We operate in one business segment: development and licensing of biopharmaceutical assets.

Principles of Consolidation

The accompanying consolidated financial statements include Ligand and its wholly-owned subsidiaries. All significant intercompany accounts and transactions have been eliminated in consolidation.

Basis of Presentation
Our consolidated financial statements have been prepared in accordance with U.S. GAAP and include the accounts of our parent company and its wholly-owned subsidiaries. All intercompany transactions and balances have been eliminated in consolidation.

Reclassifications

Certain reclassifications have been made to the previously issued financial statements to conform with the current period presentation. Specifically, our investment in Viking warrants was reclassified from "other current assets" to "investment in Viking" in the audited consolidated balance sheet as of December 31, 2018.

Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. GAAP requires the use of estimates and assumptions that affect the amounts reported in the consolidated financial statements and the accompanying notes. Actual results may differ from those estimates.

Concentrations of Business Risk

Financial instruments that potentially subject us to significant concentrations of credit risk consist primarily of cash equivalents and investments. We invest excess cash principally in United States government debt securities, investment grade corporate debt securities, mutual funds and certificates of deposit. We have established guidelines relative to diversification and maturities that maintain safety and liquidity. These guidelines are periodically reviewed and modified to take advantage of trends in yields and interest rates.

Revenue from significant partners, which is defined as 10% or more of our total revenue, was as follows:

	December 31,		
	2019	**2018**	**2017**
Partner A	13 %	40 %	46 %
Partner B	27 %	13 %	19 %
Partner C	< 10%	20 %	< 10%

We obtain Captisol primarily from two sites at a single supplier, Hovione. If this supplier were not able to supply the requested amounts of Captisol from each site, and if our safety stocks of material were depleted, we would be unable to continue to derive revenues from the sale of Captisol until we obtained material from an alternative source, which could take a considerable length of time.

Cash Equivalents & Short-term Investments

Cash equivalents consist of all investments with maturities ofthree months or less from the date of acquisition. Short-term investments primarily consist of investments in debt and equity securities and mutual funds. Debt securities have effective maturities greater than three months and less than twelve months from the date of acquisition. We classify our short-term investments as "available-for-sale". Such investments are carried at fair value, with unrealized gains and losses on debt securities included in the statement of comprehensive income (loss) and unrealized gains and losses on equity securities and mutual funds included the consolidated statement of operations. Mutual funds are valued at their net asset value (NAV) on the last day of the period. We determine the cost of investments based on the specific identification method.

Accounts Receivable

Trade accounts receivable are recorded at the net invoice value and are not interest bearing. We consider receivables past due based on the contractual payment terms which range from 30 to 90 days. We reserve specific receivables if collectability is no longer reasonably assured. We re-evaluate such reserves on a regular basis and adjust the reserves as needed. Once a receivable is deemed to be uncollectible, such balance is charged against the reserve.

Inventory

Inventory, which consists of finished goods, is stated at the lower of cost or net realizable value. We determine cost using the first-in, first-out method or the specific identification method. We analyze our inventory levels periodically and write down inventory to net realizable value if it has become obsolete, has a cost basis in excess of its expected net realizable value or is in excess of expected requirements. There were no write downs related to obsolete inventory recorded for the years ended December 31, 2019, 2018 and 2017.

Property and Equipment

Property and equipment are stated at cost, subject to review for impairment, and depreciated over the estimated useful lives of the assets, which generally range from three to ten years, using the straight-line method. Amortization of leasehold improvements is recorded over the shorter of the lease term or estimated useful life of the related asset. Maintenance and repairs are charged to operations as incurred. When assets are sold, or otherwise disposed of, the cost and related accumulated depreciation are removed from the accounts and any gain or loss is included in operating expense.

Business Combinations

The acquisition method of accounting for business combinations requires us to use significant estimates and assumptions, including fair value estimates, as of the business combination date and to refine those estimates as necessary during the measurement period (defined as the period, not to exceed one year, in which we may adjust the provisional amounts recognized for a business combination).

Under the acquisition method of accounting, we recognize separately from goodwill the identifiable assets acquired, the liabilities assumed, including contingent consideration and all contractual contingencies, generally at the acquisition date fair value. Contingent purchase consideration to be settled in cash are remeasured to estimated fair value at each reporting period with the change in fair value recorded in other income (expense), net. Costs that we incur to complete the business combination such as investment banking, legal and other professional fees are not considered part of consideration and we charge them to general and administrative expense as they are incurred.

We measure goodwill as of the acquisition date as the excess of consideration transferred, which we also measure at fair value, over the net of the acquisition date amounts of the identifiable assets acquired and liabilities assumed. In addition, IPR&D is capitalized and assessed for impairment annually. IPR&D is amortized upon product commercialization or upon out-licensing the underlying intellectual property where we have no active involvement in the licensee's development activities. IPR&D is amortized over the estimated life of the commercial product or licensing arrangement.

Should the initial accounting for a business combination be incomplete by the end of a reporting period that falls within the measurement period, we report provisional amounts in our financial statements. During the measurement period, we adjust the provisional amounts recognized at the acquisition date to reflect new information obtained about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of that date and we record those adjustments to our financial statements in the period of change, if any.

Under the acquisition method of accounting for business combinations, if we identify changes to acquired deferred tax asset valuation allowances or liabilities related to uncertain tax positions during the measurement period and they relate to new information obtained about facts and circumstances that existed as of the acquisition date, those changes are considered a measurement period adjustment and we record the offset to goodwill. We record all other changes to deferred tax asset valuation allowances and liabilities related to uncertain tax positions in current period income tax expense.

Contingent Liabilities

In connection with the acquisition of Crystal in October 2017, we may be required to pay up to an additional $10.5 million in purchase consideration upon achievement of certain commercial and development milestones to the Crystal shareholders.

In connection with the acquisition of CyDex in January 2011, we recorded a contingent liability for amounts potentially due to holders of the CyDex CVRs and former license holders. The liability is periodically assessed based on events and circumstances related to the underlying milestones, royalties and material sales. In connection with the acquisition of Metabasis in January 2010, we issued Metabasis stockholders four tradable CVRs for each Metabasis share. The fair values of the CVRs are remeasured at each reporting date through the term of the related agreement.

Any change in fair value is recorded in our consolidated statement of operations. For additional information, see "*Note (5), Fair Value Measurement and Note (8), Balance Sheet Account Details*."

Goodwill, Intangible Assets and Other Long-Lived Assets

Goodwill, which has an indefinite useful life, represents the excess of cost over fair value of net assets acquired. Goodwill is reviewed for impairment at least annually during the fourth quarter, or more frequently if an event occurs indicating the potential for impairment. During the goodwill impairment review, we assess qualitative factors to determine whether it is more likely than not that the fair value of our reporting unit is less than the carrying amount, including goodwill. We operate in one reporting unit. The qualitative factors include, but are not limited to, macroeconomic conditions, industry and market considerations, and the overall financial performance. If, after assessing the totality of these qualitative factors, we determine that it is not more likely than not that the fair value of our reporting unit is less than the carrying amount, then no additional assessment is deemed necessary. Otherwise, we proceed to perform the quantitative assessment. We will then evaluate goodwill for impairment by comparing the estimated fair value of the reporting unit to its carrying value, including the associated goodwill. To determine the fair value, we generally use a combination of market approach based on comparable publicly traded companies in similar lines of businesses and the income approach based on estimated discounted future cash flows. Our cash flow assumptions consider historical and forecasted revenue, operating costs and other relevant factors. We may also elect to bypass the qualitative assessment in a period and elect to proceed to perform the quantitative assessment for the goodwill impairment test. We performed the annual assessment for goodwill impairment during the fourth quarter of 2019, noting no impairment.

Our identifiable intangible assets are typically composed of acquired core technologies, licensed technologies, customer relationships and trade names. The cost of identifiable intangible assets with finite lives is generally amortized on a straight-line basis over the assets' respective estimated useful lives. We regularly perform reviews to determine if any event has occurred that may indicate that intangible assets with finite useful lives and other long-lived assets are potentially impaired. If indicators of impairment exist, an impairment test is performed to assess the recoverability of the affected assets by determining whether the carrying amount of such assets exceeds the undiscounted expected future cash flows. If the affected assets are not recoverable, we estimate the fair value of the assets and record an impairment loss if the carrying value of the assets exceeds the fair value. Factors that may indicate potential impairment include a significant decline in our stock price and market capitalization compared to the net book value, significant changes in the ability of a particular asset to generate positive cash flows, and the pattern of utilization of a particular asset.

Commercial license and other economic rights

Commercial license and other economic rights consist of the following (in thousands):

	As of December 31,	
	2019	2018
Aziyo & CorMatrix	$ 17,696	$ 17,696
Palvella	10,000	10,000
Selexis	8,602	8,602
Dianomi	2,000	—
	38,298	36,298
Less: accumulated amortization attributed to principal or research and development	(18,208)	(4,838)
Total commercial license and other economic rights, net	$ 20,090	$ 31,460

Commercial license and other economic rights as of December 31, 2019 represent a portfolio of future milestone and royalty payment rights acquired from Selexis in April 2013 and April 2015, CorMatrix in May 2016, Palvella in December 2018, and Dianomi in January 2019. Commercial license rights acquired are accounted for as financial assets, and other economic rights are accounted for as funded research and developments as further discussed below.

In May 2019, we entered into a development funding and royalties agreement with Novan, pursuant to which we would receive certain payments at specified milestones, as well as royalties on any future net sales of SB206, a product candidate being developed to treat molluscum contagiosum, and any other Novan products used for the treatment of molluscum ("Novan Molluscum Products"). We paid Novan an upfront payment of $12.0 million, which Novan is required to use to fund the development of SB206. We are not obligated to provide additional funding to Novan for the development or commercialization of SB206. Pursuant to the agreement, we would receive up to $20.0 million of milestone payments upon the achievement by Novan of certain regulatory milestones for SB206 or any other Novan Molluscum Product and commercial milestones. In addition to the milestone payments, Novan will pay us tiered royalties from 7.0% to 10.0% based on aggregate annual net sales of SB206 or any other Novan Molluscum Product in North America. We determined the economic rights related to Novan should be characterized as a funded research and development arrangement, thus we account for it in accordance with ASC 730-20, *Research and Development Arrangement*, and reduce our asset as the funds are expended by Novan. As of December 31, 2019, Novan had used up the $12.0 million upfront payment provided by us. As such, our other economic rights related to Novan has been fully amortized as of December 31, 2019.

In December 2018, we entered into a development funding and royalties agreement with Palvella. Pursuant to the agreement, we will receive up to $8.0 million of milestone payments upon the achievement by Palvella of certain corporate, financing and regulatory milestones for PTX-022, a product candidate being developed to treat pachyonychia congentia. In addition to the milestone payments, Palvella will pay us tiered royalties from 5.0% to 9.8% based on aggregate annual worldwide net sales of any PTX-022 products, if approved, subject to Palvella's right to reduce the royalty rates by making payments in certain circumstances. We made an upfront payment of $10.0 million, which Palvella is required to use to fund the development of PTX-022. We are not obligated to provide additional funding to Palvella for development or commercialization of PTX-022. We determined the economic rights related to Palvella should be characterized as a funded research and development arrangement, thus we account for it in accordance with ASC 730-20, and will reduce our asset as the funds are expended by Palvella. We will evaluate the remaining asset basis for impairment on an ongoing basis. It is anticipated that the cost basis of the asset will be reduced to zero prior to the receipt of any payments from Palvella. Therefore, we will recognize milestones and royalties as revenue when earned.

In May 2017, we entered into a royalty agreement with Aziyo pursuant to which we will receive royalties from certain marketed products that Aziyo acquired from CorMatrix. Pursuant to the agreement, we received $10.0 million in 2017 from Aziyo to buydown the royalty rates on the products CorMatrix sold to Aziyo. The agreement closed on May 31, 2017, in connection with the closing of the asset sale from CorMatrix to Aziyo (the "CorMatrix Asset Sale"). Per the agreement, we will receive a 5% royalty on the products Aziyo acquired in the CorMatrix Asset Sale, reduced from the original 20% royalty from CorMatrix pursuant to the previously disclosed interest purchase agreement, dated May 3, 2016 (the "Original Interest Purchase Agreement") between CorMatrix and us. In addition, Aziyo has agreed to pay us up to $10.0 million of additional milestones tied to cumulative net sales of the products Aziyo acquired in the CorMatrix Asset Sale and to extend the term on these royalties by one year. The royalty agreement will terminate on May 31, 2027. In addition, in May 2017, we entered into an amended and restated interest purchase agreement (the "Amended Interest Purchase Agreement") with CorMatrix, which supersedes in its entirety the Original Interest Purchase Agreement. Other than removing the commercial products sold to Aziyo in the CorMatrix Sale, the terms of the Amended Interest Purchase Agreement remain unchanged with respect to the CorMatrix

developmental pipeline products, including the royalty rate of 5% on such pipeline products. The Amended Interest Purchase Agreement will terminate 10 years from the date of the first commercial sale of such products.

We account for the Aziyo commercial license right as a financial asset in accordance with ASC 310,*Receivables*, and amortize the commercial license right using the effective interest method whereby we forecast expected cash flows over the term of the arrangement to arrive at an annualized effective interest. The annual effective interest associated with the forecasted cash flows from the royalty agreement with Aziyo as of December 31, 2019 is 23%. Revenue is calculated by multiplying the carrying value of the commercial license right by the effective interest. The payments received in 2019 were accordingly allocated between revenue and the amortization of the commercial license rights.

For commercial license rights, we have elected a prospective approach to account for changes in estimated cash flows and selected a method for determining when an impairment would be recognized and how to measure that impairment. In circumstances where our new estimate of expected cash flows is greater than previously expected, we will update our yield prospectively. In circumstances where our new estimate of expected cash flows is less than previously expected and below our original estimated yield we record an impairment. Impairment is recognized by reducing the financial asset to an amount that represents the present value of our most recent estimate of expected cash flows discounted by the original effective interest rate. In circumstances where our new estimate of expected cash flows is less than previously expected, but not below our original estimated yield, we update our yield prospectively.

We account for commercial license rights related to developmental pipeline products such as Selexis and Dianomi on a non-accrual basis. These developmental pipeline products are non-commercialized, non-approved products that require FDA or other regulatory approval, and thus have uncertain cash flows. The developmental pipeline products are on a non-accrual basis as we are not yet able to forecast future cash flows given their pre-commercial stages of development. We will prospectively update the yield model under the effective interest method once the underlying products are commercialized and we can reliably forecast expected cash flows. Income will be calculated by multiplying the carrying value of the commercial license right by the effective interest rate. We regularly perform reviews to determine if any event has occurred that may indicate the carrying value of these commercial license rights are potentially impaired. If the affected commercial license rights are not recoverable, we estimate the fair value of the assets and record an impairment loss if the carrying value of the assets exceeds the fair value. We recorded a $5.1 million reduction in the carrying value of the Selexis asset which was reflected in other expense, net, in our consolidated statement of operations for the twelve months ended December 31, 2019.

Revenue Recognition

Our revenue is generated primarily from royalties on sales of products commercialized by our partners, Captisol material sales, license fees and development, regulatory and sales based milestone payments.

On January 1, 2018, we adopted Accounting Standards Update (ASU) 2014-09,*Revenue from Contracts with Customers (Topic 606)*, which amends the guidance for recognition of revenue from contracts with customers by using the modified-retrospective method applied to those contracts that were not completed as of January 1, 2018. The results for reporting periods beginning January 1, 2018, are presented in accordance with the new standard, although comparative information has not been restated and continues to be reported under the accounting standards and policies in effect for those periods. See additional information in *Disaggregation of Revenue* subsection below. Our accounting policies under the new standard were applied prospectively and are noted below.

Royalties, License Fees and Milestones

We receive royalty revenue on sales by our partners of products covered by patents that we or our partners own under the contractual agreements. We do not have future performance obligations under these license arrangements. We generally satisfy our obligation to grant intellectual property rights on the effective date of the contract. However, we apply the royalty recognition constraint required under the guidance for sales-based royalties which requires a sales-based royalty to be recorded no sooner than the underlying sale. Therefore, royalties on sales of products commercialized by our partners are recognized in the quarter the product is sold. Our partners generally report sales information to us on a one quarter lag. Thus, we estimate the expected royalty proceeds based on an analysis of historical experience and interim data provided by our partners including their publicly announced sales. Differences between actual and estimated royalty revenues are adjusted for in the period in which they become known, typically the following quarter.

Our contracts with customers often will include future contingent milestone based payments. We include contingent milestone based payments in the estimated transaction price when it is probable to estimate the amount of the payment. These estimates are based on historical experience, anticipated results and our best judgment at the time. If the contingent milestone based

payment is sales-based, we apply the royalty recognition constraint and record revenue when the underlying sale has taken place. Significant judgments must be made in determining the transaction price for our sales of intellectual property. Because of the risk that products in development with our partners will not reach development based milestones or receive regulatory approval, we generally recognize any contingent payments that would be due to us upon the development milestone or regulatory approval. Depending on the terms of the arrangement, we may also defer a portion of the consideration received because we have to satisfy a future obligation. We use an observable price to determine the stand-alone selling price for separate performance obligations or a cost plus margin approach when one is not available.

For R&D services that we recognize over time, we measure our progress using an input method. The input methods we use are based on the effort we expend or costs we incur toward the satisfaction of our performance obligation. We estimate the amount of effort we expend, including the time we estimate it will take us to complete the activities, or costs we incur in a given period, relative to the estimated total effort or costs to satisfy the performance obligation. This results in a percentage that we multiply by the transaction price to determine the amount of revenue we recognize each period. This approach requires us to make estimates and use judgement. If our estimates or judgements change over the course of the collaboration, they may affect the timing and amount of revenue that we recognize in the current and future periods.

Material Sales

We recognize revenue when control of Captisol material or intellectual property license rights is transferred to our customers in an amount that reflects the consideration we expect to receive from our customers in exchange for those products. This process involves identifying the contract with a customer, determining the performance obligations in the contract, determining the contract price, allocating the contract price to the distinct performance obligations in the contract, and recognizing revenue when the performance obligations have been satisfied. A performance obligation is considered distinct from other obligations in a contract when it provides a benefit to the customer either on its own or together with other resources that are readily available to the customer and is separately identified in the contract. We consider a performance obligation satisfied once we have transferred control of the product, meaning the customer has the ability to use and obtain the benefit of the Captisol material or intellectual property license right. We recognize revenue for satisfied performance obligations only when we determine there are no uncertainties regarding payment terms or transfer of control. Sales tax and other taxes we collect concurrent with revenue-producing activities are excluded from revenue. We have elected to recognize the cost for freight and shipping when control over Captisol material has transferred to the customer as an expense in cost of material sales. We expense incremental costs of obtaining a contract when incurred if the expected amortization period of the asset that we would have recognized is one year or less or the amount is immaterial. We did not incur any incremental costs of obtaining a contract during the periods reported.

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled receivables (contract assets), and customer advances and deposits (contract liabilities) on the consolidated balance sheet. Except for royalty revenue, we generally receive payment at the point we satisfy our obligation or soon after. Therefore, we do not generally carry a contract asset balance. Any fees billed in advance of being earned are recorded as deferred revenue. During the twelve months ended December 31, 2019, the amount recognized as revenue that was previously deferred at prior year-end was $3.3 million. During the twelve months ended December 31, 2018, the amount recognized as revenue that was previously deferred at prior year-end was $2.3 million.

We have revenue sharing arrangements whereby certain revenue proceeds are shared with a third party. The revenue standard requires an entity to determine whether it is a principal or an agent in these transactions by evaluating the nature of its promise to the customer. We received $4.6 million royalty payments from a license partner during 2019 of which $4.0 million was paid to a third-party in-licensor. We recorded net revenue of $0.6 million as we believe we are an agent in the transaction. We recorded an immaterial amount due to third-party in-licensors as general and administrative expenses as we are the principal in the transaction during 2019.

Disaggregation of Revenue

Royalty revenue for 2019, 2018 and 2017 are reported as below (in thousands):

	Year ended December 31,		
	2019[1]	2018[1]	2017[2]
Promacta	$ 14,193	$ 99,260	$ 62,918
Kyprolis	25,046	21,686	16,413
Evomela	5,171	5,658	7,155
Other	2,566	1,952	2,199
	$ 46,976	$ 128,556	$ 88,685

(1) Royalty revenue for 2019 and 2018 was reported under the current revenue recognition guidance (ASC 606).
(2) Royalty revenue for 2017 was reported under the legacy revenue recognition guidance (ASC 605).

The following table represents disaggregation of Material Sales and License fees, milestone and other (in thousands), which are not affected by the adoption of ASC 606:

	Year ended December 31,		
	2019	2018	2017
Material Sales			
Captisol	$ 31,489	$ 29,123	$ 22,070
License fees, milestones and other			
License fees	6,199	78,195	13,665
Milestones	23,451	6,577	11,093
Other	12,167	9,002	5,589
	$ 41,817	$ 93,774	$ 30,347

Preclinical Study and Clinical Trial Accruals

Substantial portions of our preclinical studies and all of our clinical trials have been performed by third-party laboratories, CROs. We account for a significant portion of the clinical study costs according to the terms of our contracts with CROs. The terms of the CRO contracts may result in payment flows that do not match the periods over which services are provided to us under such contracts. Our objective is to reflect the appropriate preclinical and clinical trial expenses in our financial statements in the same period as the services occur. As part of the process of preparing our financial statements, we rely on cost information provided by our CROs. We are also required to estimate certain of our expenses resulting from the obligations under the CRO contracts. Accordingly, our preclinical study and clinical trial accrual is dependent upon the timely and accurate reporting of CROs and other third-party vendors. We periodically evaluate our estimates to determine if adjustments are necessary or appropriate as more information becomes available concerning changing circumstances, and conditions or events that may affect such estimates. No material adjustments to preclinical study and clinical trial accrued expenses have been recognized to date.

Research and Development Expenses

Research and development expense consists of labor, material, equipment, and allocated facilities costs of our scientific staff who are working pursuant to our collaborative agreements and other research and development projects. Also included in research and development expenses are third-party costs incurred for our research programs including in-licensing costs, CRO costs and costs incurred by other research and development service vendors. We expense these costs as they are incurred. When we make payments for research and development services prior to the services being rendered, we record those amounts as prepaid assets on our consolidated balance sheet and we expense them as the services are provided. In addition, the amortization of the above mentioned other economic rights such as Palvella and Novan are included in research and development expenses in accordance with ASC 730-20.

Share-Based Compensation

We incur share-based compensation expense related to restricted stock, ESPP, and stock options.

Restricted stock unit (RSU) and performance stock unit (PSU) are all considered restricted stock. The fair value of restricted stock is determined by the closing market price of our common stock on the date of grant. We recognize share-based compensation expense based on the fair value on a straight-line basis over the requisite service periods of the awards, taking into consideration of forfeitures as they occur. PSU represents a right to receive a certain number of shares of common stock based on the achievement of corporate performance goals and continued employment during the vesting period. At each reporting period, we reassess the probability of the achievement of such corporate performance goals and any expense change resulting from an adjustment in the estimated shares to be released are treated as a cumulative catch-up in the period of adjustment.

We use the Black-Scholes-Merton option-pricing model to estimate the fair value of stock purchases under ESPP and stock options granted. The model assumptions include expected volatility, term, dividends, and the risk-free interest rate. We look to historical and implied volatilities of our stock to determine the expected volatility. The expected term of an award is based on historical forfeiture experience, exercise activity, and on the terms and conditions of the stock awards. The expected dividend yield is determined to be 0% given that except for 2007, during which we declared a cash dividend on our common stock of $2.50 per share, we have not paid any dividends on our common stock in the past and currently do not expect to pay cash dividends or make any other distributions on common stock in the future. The risk-free interest rate is based upon U.S. Treasury securities with remaining terms similar to the expected term of the share-based awards.

We grant options, RSUs and PSUs to employees and non-employee directors. Non-employee directors are accounted for as employees. Options and RSUs granted to certain non-employee directors typically vest one year from the date of grant. Options granted to employees typically vest 1/8 on the six month anniversary of the date of grant, and 1/48 each month thereafter for forty-two months. RSUs and PSUs granted to employees vest over three years. All option awards generally expire ten years from the date of grant.

Share-based compensation expense for awards to employees and non-employee directors is recognized on a straight-line basis over the vesting period until the last tranche vests.

Derivatives

In May 2018, we issued $750.0 million aggregate principal amount of 2023 Notes, bearing cash interest at a rate of 0.75% per year, payable semi-annually, as further described in "*Note (7), Convertible Senior Notes*." Concurrently with the issuance of the notes, we entered into a series of convertible note hedge and warrant transactions which in combination are designed to reduce the potential dilution to our stockholders and/or offset the cash payments we are required to make in excess of the principal amount upon conversion of the notes. The conversion option associated with the 2023 Notes temporarily met the criteria for an embedded derivative liability which required bifurcation and separate accounting. In addition, the note hedge and warrants were also temporarily classified as a derivative asset and liability, respectively, on our consolidated balance sheet. As a result of shareholder approval to increase the number of authorized shares of our common stock on June 19, 2018, as discussed in "*Note (7), Convertible Senior Notes*," the derivative asset and liabilities were reclassified to additional paid-in capital. Changes in the fair value of these derivatives prior to being classified in equity were reflected in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2018.

In connection with our 2019 Notes, which we issued in August 2014 for $245.0 million aggregate principal amount, on May 22, 2018, we amended it making an irrevocable election to settle the entire note in cash. As a result, we reclassified from equity to derivative liability the fair value of the conversion premium as of May 22, 2018. Amounts paid in excess of the principal amount would be offset by an equal receipt of cash under the corresponding convertible bond hedge. As a result, we reclassified from equity to derivative asset the fair value of the bond hedge as of May 22, 2018. Changes in the fair value of these derivatives are reflected in other expense, net, in our consolidated statements of operations.

In connection with the payoff of the 2019 Notes in August 15, 2019, the bond hedge was settled and accordingly, the derivative asset and derivative liability were settled to zero. See detail in "*Note (7), Convertible Senior Notes*."

Income Taxes

The provision for income taxes is computed using the asset and liability method, under which deferred tax assets and liabilities are recognized for the expected future tax consequences of temporary differences between the financial reporting and tax bases of assets and liabilities, and for the expected future tax benefit to be derived from tax loss and credit carryforwards. Deferred tax assets and liabilities are determined using the enacted tax rates in effect for the years in which those tax assets are expected

to be realized. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in the provision for income taxes in the period that includes the enactment date.

Deferred tax assets are regularly assessed to determine the likelihood they will be recovered from future taxable income. A valuation allowance is established when we believe it is more likely than not the future realization of all or some of a deferred tax asset will not be achieved. In evaluating the ability to recover deferred tax assets within the jurisdiction which they arise we consider all available positive and negative evidence. Factors reviewed include the cumulative pre-tax book income for the past three years, scheduled reversals of deferred tax liabilities, history of earnings and reliable forecasting, projections of pre-tax book income over the foreseeable future, and the impact of any feasible and prudent tax planning strategies.

We recognize the impact of a tax position in our financial statements only if that position is more likely than not of being sustained upon examination by taxing authorities, based on the technical merits of the position. Tax authorities regularly examine our returns in the jurisdictions in which we do business and we regularly assess the tax risk of our return filing positions. Due to the complexity of some of the uncertainties, the ultimate resolution may result in payments that are materially different from our current estimate of the tax liability. These differences, as well as any interest and penalties, will be reflected in the provision for income taxes in the period in which they are determined.

Income (loss) Per Share

Basic income (loss) per share is calculated by dividing net income (loss) by the weighted-average number of common shares outstanding during the period. Diluted income per share is computed based on the sum of the weighted average number of common shares and potentially dilutive common shares outstanding during the period. Diluted loss per share is computed based on the sum of the weighted average number of common shares outstanding during the period.

Potentially dilutive common shares consist of shares issuable under 2019 and 2023 convertible senior notes, stock options and restricted stock. 2019 and 2023 convertible senior notes have a dilutive impact when the average market price of the Company's common stock exceeds the applicable conversion price of the respective notes. It is our intent and policy to settle conversions through combination settlement, which essentially involves payment in cash equal to the principal portion and delivery of shares of common stock for the excess of the conversion value over the principal portion. In addition, post May 22, 2018, the 2019 Notes can only be settled in cash and therefore there will be no further impact on income (loss) per share of these notes. Potentially dilutive common shares from stock options and restricted stock are determined using the average share price for each period under the treasury stock method. In addition, the following amounts are assumed to be used to repurchase shares: proceeds from exercise of stock options and the average amount of unrecognized compensation expense for stock options and restricted stock. In loss periods, basic net loss per share and diluted net loss per share are identical since the effect of otherwise dilutive potential common shares is anti-dilutive and therefore excluded.

The following table presents the calculation of weighted average shares used to calculate basic and diluted earnings per share (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Weighted average shares outstanding:	18,995	21,160	21,032
Dilutive potential common shares:			
Restricted stock	43	72	141
Stock options	719	1,125	1,000
Warrants associated with 2019 Notes	—	1,017	94
2019 Convertible Senior Notes	—	693	1,214
Shares used to compute diluted income per share	19,757	24,067	23,481
Potentially dilutive shares excluded from calculation due to anti-dilutive effect	8,926	2,845	335

Comprehensive Income (Loss)

Comprehensive income (loss) represents net income (loss) adjusted for the change during the periods presented in unrealized gains and losses on available-for-sale securities, foreign currency translation adjustments, and reclassification adjustments for realized gains or losses included in net income (loss). The unrealized gains or losses are reported on the Consolidated Statements of Comprehensive Income (Loss).

Foreign Currency Translation

The British Pound Sterling is the functional currency of Vernalis and the corresponding financial statements have been translated into U.S. Dollars in accordance with ASC 830-30, *Translation of Financial Statements*. Assets and liabilities are translated at end-of-period rates while revenues and expenses are translated at average rates in effect during the period in which the activity took place. Equity is translated at historical rates and the resulting cumulative translation adjustments are included as a component of accumulated other comprehensive income (loss).

Accounting Standards Recently Adopted

Leases - In February 2016, the FASB issued ASU 2016-02,*Leases (Topic 842)*. This standard requires organizations that lease assets to recognize the assets and liabilities created by those leases. The standard also requires disclosures to help investors and other financial statement users better understand the amount, timing, and uncertainty of cash flows arising from leases. In 2018, the FASB issued guidance that provides an optional transition method for adoption of this standard, which allows organizations to initially apply the new requirements at the effective date, recognize a cumulative effect adjustment to the opening balance of retained earnings, and continue to apply the legacy guidance in ASC 840, *Leases (Topic 840),* including its disclosure requirements, in the comparative periods presented. We adopted this standard on January 1, 2019 by applying this optional transition method. For leases with a term of 12 months or less, we elected to not recognize lease assets and lease liabilities and expense the leases over a straight-line basis for the term of those leases. In addition, we elected the available package of practical expedients upon adoption, which allowed us to carry forward our historical assessment of whether existing agreements contained a lease and the classification of our existing operating leases. We did not elect to use the hindsight practical expedient to determine the lease term or evaluate impairment for existing leases. We continue to report our financial position as of December 31, 2018 under Topic 840 in our audited consolidated balance sheet. The adoption of this standard update resulted in the recognition of right-of-use assets of approximately $5.2 million and lease liabilities of approximately $5.9 million on our consolidated balance as of January 1, 2019, with no material impact to our consolidated statement of operations. See *"Note (6), Leases"* for further information regarding the impact of the adoption of ASU 2016-02 on our financial statements.

Accounting Standards Not Yet Adopted

Financial Instruments - In June 2016, the FASB issued ASU 2016-13,*Financial Instruments - Credit Losses: Measurement of Credit Losses on Financial Instruments (Topic 326)*, which amends the impairment model by requiring entities to use a forward-looking approach based on expected losses to estimate credit losses on certain types of financial instruments, including trade receivables. ASU 2016-13 is effective for us beginning in the first quarter of 2020, with early adoption permitted. This standard includes our financial instruments, such as accounts receivable, investments that are generally of high credit quality, and commercial license rights. Previously, when credit losses were measured under GAAP, an entity generally only considered past events and current conditions in measuring the incurred loss. The new guidance requires us to identify, analyze, document and support new methodologies for quantifying expected credit loss estimates for our financial instruments, using information such as historical experience and current economic conditions, plus the use of reasonable supportable forecast information. We will adopt this standard effective January 1, 2020, and we currently do not expect the adoption to result in a material impact to our consolidated financial statements.

Goodwill Impairment Testing - In January 2017, the FASB issued ASU 2017-04,*Simplifying the Test for Goodwill Impairment,* which eliminates the requirement to perform a hypothetical purchase price allocation to measure goodwill impairment. Under the new standard the goodwill impairment test is performed by comparing the fair value of a reporting unit with its carrying amount, and recognizing an impairment charge for the amount by which the carrying amount of the reporting unit exceeds its fair value, although it cannot exceed the total amount of goodwill allocated to that reporting unit. This standard is effective for us beginning in the first quarter of 2020, with earlier adoption permitted. We will adopt this standard effective January 1, 2020 and do not expect the adoption to have a material impact on our consolidated financial statements.

Fair Value Measurement - In August 2018, the FASB issued ASU 2018-13,*Fair Value Measurement: Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement (Topic 820)*, which modifies the disclosure requirements on fair value measurements. ASU 2018-13 is effective for us beginning in the first quarter of 2020, with earlier adoption permitted. We will adopt this standard effective January 1, 2020, and will include the required disclosure beginning in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2020.

Collaborative Arrangements - In November 2018, the FASB issued ASU 2018-18 *Collaborative Arrangements: Clarifying the Interaction between Topic 808 and Topic 606 (Topic 808)*. The new standard clarifies that certain transactions between participants in a collaborative arrangement should be accounted for under Topic 606,*Revenue from Contracts with Customers*, when the counterparty is a customer for a good or service that is a distinct unit of account. The amendments also preclude entities from presenting consideration from transactions with a collaborator that is not a customer together with revenue

recognized from contracts with customers. The new standard is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. Early adoption is permitted in any interim period for entities that have adopted ASC 606. The standard should be applied retrospectively to the period when we initially adopted ASC 606. We will adopt this standard effective January 1, 2020, and do not expect the adoption will result in material impact to our consolidated financial statements.

We do not believe that any other recently issued, but not yet effective accounting pronouncements, if adopted, would have a material impact on our consolidated financial statements or disclosures.

2. Sale of Promacta License

On March 5, 2019, we entered into an Asset Purchase Agreement (the "Asset Purchase Agreement") with RPI Finance Trust ("RPI"), doing business as "Royalty Pharma", who is not an affiliate. Under the Asset Purchase Agreement, we sold, transferred, assigned and conveyed to RPI, and RPI purchased, acquired and accepted from us, all of our rights, title and interest in and to the Purchased Assets, which include among other things the intellectual property and related know-how generated by us in connection with the license agreement (collectively, the "Purchased Assets"), dated December 29, 1994, by and between Novartis (as successor in interest to SmithKline Beecham Corporation) and Ligand, which allowed us to receive a royalty on net sales of Promacta. We concluded the sale does not qualify as a sale of a business, but as a sale of a non-financial asset. At the closing on March 6, 2019, RPI paid us $827.0 million in cash and we do not have any remaining performance obligations related to Novartis or RPI for Promacta. The carrying value of our Promacta asset as of March 6, 2019 was zero. Of the total cash proceeds from the sale, $14.2 million was recorded to revenue related to the Promacta royalty for the period between January 1, 2019 and March 6, 2019, and the remaining $812.8 million was recorded to income from operations in accordance with ASC 610-20, *Other Income - Gains and Losses from the Derecognition of Nonfinancial Assets*.

3. Investment in Viking

Our ownership in Viking was approximately 10.3% as of December 31, 2019, and we account for it as investment in an available-for-sale security, which is measured at fair value, with changes in fair value recognized in net income.

Prior to February 2018, we accounted for our investment in Viking under the equity method. As a result of Viking's public stock offerings, we recorded a dilution gain of $27 million for the year ended December 31, 2017. These amounts were recognized in Loss from Viking in our consolidated statement of operations. Our equity ownership interest in Viking decreased during the first quarter of 2018 to approximately 12.4% due to Viking's financing events in February 2018. As a result, in February 2018, we concluded that we did not exert significant influence over Viking and discontinued accounting for our investment in Viking under the equity method. Viking is considered a related party as we maintain a seat on Viking's board of directors.

As of December 31, 2019 and December 31, 2018, we recorded our common stock in Viking at fair value of $48.4 million and $46.2 million, respectively. We also have outstanding warrants to purchase 1.5 million shares of Viking's common stock at an exercise price of $1.50 per share. We recorded the warrants in "investment in Viking" in our consolidated balance sheets at fair value of $9.9 million and $9.3 million at December 31, 2019 and 2018, respectively. See further discussion in "*Note (5), Fair Value Measurement.*"

Subsequent to the adoption of ASU 2016-01, *Financial Instruments - Overall (Subtopic 825-10),* on January 1, 2018, we no longer account for our investment in Viking under the equity method; instead, it is measured at fair value, with changes in fair value recognized in net income (loss).

4. Business Combinations

As set forth below, we completed three acquisitions from January 1, 2017 through December 31, 2019, and all were accounted for as business combinations. We applied the acquisition method of accounting. Accordingly, we recorded the tangible and intangible assets acquired and liabilities assumed at their estimated fair values as of the applicable date of acquisition. For each acquisition, we did not incur any material acquisition related costs.

Ab Initio Acquisition

On July 23, 2019, we acquired privately-held Ab Initio, an antigen-discovery company located in South San Francisco, California. Ab Initio has a patented antigen technology that is synergistic with the OmniAb® therapeutic antibody discovery platform, providing our current and potential new partners enhanced capabilities for the discovery of therapeutic antibodies

against difficult-to-access cellular targets. Ab Initio has a collaboration agreement with Pfizer to discover novel therapeutic antibodies against an undisclosed target in the GPCR superfamily.

The purchase price of $12.0 million included $11.84 million cash consideration paid upon acquisition, net of cash acquired, and $0.15 million cash holdback for potential indemnification claims. As the acquisition is not considered significant, pro forma information has not been provided.

The preliminary allocation of the consideration was allocated to the acquisition date fair values of acquired assets and assumed liabilities as follows (in thousands):

Cash and other assets	$	28
Accounts payable and accrued liabilities		(83)
Deferred tax liabilities, net		(1,609)
Intangibles assets with finite life - core technologies		7,400
Goodwill		6,275
	$	12,011

None of the goodwill is deductible for tax purposes. The fair value of the core technologies was determined based on the discounted cash flow method that estimated the present value of the hypothetical royalty/ milestone streams from the licensing of the antigen-discovery technology and collaboration agreement. These projected cash flows were discounted to present value using a discount rate of 12.0%. The fair value of the core technologies is being amortized on a straight-line basis over the weighted average estimated useful life of approximately 20 years.

The estimated fair values of assets acquired and liabilities assumed, including deferred tax assets and liabilities, and purchased intangibles are provisional. The accounting for these amounts falls within the measurement period and therefore we may adjust these provisional amounts to reflect new information obtained about facts and circumstances that existed as of the acquisition date.

Vernalis Acquisition

In October 2018, we acquired Vernalis, a structure-based drug discovery biotechnology company for $43.0 million, funded through cash on hand. The acquisition of Vernalis increases our overall portfolio of fully-funded programs. As Vernalis' operations are not considered material, pro forma information is not provided.

The final purchase consideration was allocated to the acquisition date fair values of acquired assets and assumed liabilities as follows (in thousands):

Cash and cash equivalents	$	34,286
Restricted cash		2,836
Other assets		6,383
Accounts payable and accrued liabilities		(3,479)
Restructuring and product reserves		(9,241)
Deferred revenue		(746)
Intangibles assets with finite life - core technologies		7,000
Goodwill		5,939
	$	42,978

None of the goodwill is deductible for tax purposes. The fair value of the core technologies was based on the discounted cash flow method that estimated the present value of the hypothetical royalty/milestone streams derived from the licensing of the related technologies. These projected cash flows were discounted to present value using a discount rate of 34.0%. The fair value of the core technology is being amortized on a straight-line basis over the weighted average estimated useful life of approximately nine years.

Crystal Acquisition

On October 6, 2017, we acquired all of the assets and liabilities of Crystal. Crystal is a biotechnology company focused in avian genetics and the generation of fully-human therapeutic engineering of animals for the generation of fully-human therapeutic antibodies through its OmniChicken® technology. Under the terms of the agreement, we were to pay Crystal selling shareholders $27.2 million in cash including a $2.2 million working capital adjustment, and up to an additional $10.5 million of cash consideration based on Crystal's achievement of certain research and business milestones prior to December 31, 2019. In addition, Crystal's selling shareholders will receive 10% of revenues realized by Ligand above $15 million between the closing date and December 31, 2022 from existing collaboration agreements between Crystal and three of its collaborators, and Crystal's selling shareholders will receive 20% of revenues above $1.5 million generated between the closing date and December 31, 2022 pursuant to a fourth existing collaboration agreement with a large pharmaceutical company. As of December 31, 2019, $0.02 million of the initial $27.2 million of cash consideration remained outstanding.

At the closing of the acquisition, we recorded an $8.4 million contingent liability for amounts potentially due to Crystal shareholders. The initial fair value of the liability was determined using a probability weighted income approach incorporating the estimated future cash flows from potential milestones and revenue sharing. These cash flows were then discounted to present value using discount rates based on our estimated corporate credit rating, and averaged to approximately 4.6%. Refer to *Note 5 Fair Value Measurement* for further discussion. The liability has been periodically assessed based on events and circumstances related to the underlying milestones, and any changes in fair value are recorded in our consolidated statements of operations. The carrying amount of the liability may fluctuate significantly and actual amounts paid may be materially different than the carrying amount of the liability. For additional information, see "*Note (8), Balance Sheet Account Details*."

The final aggregate acquisition consideration was determined to be $35.7 million, consisting of (in thousands):

Cash paid to Crystal shareholders	$	26,877
Cash payable to Crystal Shareholders		336
Assumed liabilities		129
Fair value of contingent consideration		8,401
Total consideration	$	35,743

The acquisition consideration was allocated to the acquisition date fair values of acquired assets and assumed liabilities as follows (in thousands):

Cash and cash equivalents	$	224
Accounts receivable		2,513
Prepaid expenses and other assets		201
Property and equipment, net		589
Current liabilities assumed		(354)
Deferred revenue		(4,624)
Deferred tax liabilities, net		(9,503)
Intangible asset with finite life - core technology		36,000
Goodwill		10,697
Total consideration	$	35,743

The fair value of the core technology, or OmniChicken technology, was based on the discounted cash flow method that estimated the present value of a hypothetical royalty stream derived from the licensing of the OmniChicken technology. These projected cash flows were discounted to present value using a discount rate of 10.8%. The fair value of the core technology is being amortized on a straight-line basis over the estimated useful life of 20 years.

The excess of the acquisition date consideration over the fair values assigned to the assets acquired and the liabilities assumed was $10.7 million and was recorded as goodwill, which is not deductible for tax purposes and is primarily attributable to Crystal's potential revenue growth from combining the Crystal and Ligand businesses and workforce, as well as the benefits of access to different markets and customers.

5. Fair Value Measurement

We measure certain financial assets and liabilities at fair value on a recurring basis. Fair value is a market-based measurement that should be determined using assumptions that market participants would use in pricing an asset or liability. We establish a three-level hierarchy to prioritize the inputs used in measuring fair value. The levels are described in the below with level 1 having the highest priority and level 3 having the lowest:

Level 1 - Observable inputs such as quoted prices in active markets

Level 2 - Inputs other than the quoted prices in active markets that are observable either directly or indirectly

Level 3 - Unobservable inputs in which there is little or no market data, which require the Company to develop its own assumptions

The following table provides a summary of the assets and liabilities that are measured at fair value on a recurring basis as of December 31, 2019 and 2018 (in thousands):

	Fair Value Measurements at Reporting Date Using			
December 31, 2019	**Total**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Assets:				
Short-term investments [1]	$ 939,989	$ 3,073	$ 936,791	$ 125
Investment in Viking common stock	48,425	48,425	—	—
Investment in Viking warrants [2]	9,910	9,910	—	—
Total assets	$ 998,324	$ 61,408	$ 936,791	$ 125
Liabilities:				
Contingent liabilities - Crystal [3]	$ 2,659	$ —	$ —	$ 2,659
Contingent liabilities - Cydex	348	—	—	348
Contingent liabilities - Metabasis [4]	5,935	—	5,935	—
Liability for amounts owed to a former licensor	75	75	—	—
Total liabilities	$ 9,017	$ 75	$ 5,935	$ 3,007

	Fair Value Measurements at Reporting Date Using			
December 31, 2018	**Total**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Assets:				
Short-term investments [1]	$ 601,217	$ 1,326	$ 599,891	$ —
Investment in Viking common stock	46,191	46,191	—	—
Investment in Viking warrants [2]	9,257	9,257	—	—
Total assets	$ 656,665	$ 56,774	$ 599,891	$ —
Liabilities:				
Contingent liabilities - Crystal [3]	$ 6,477	$ —	$ —	$ 6,477
Contingent liabilities - Cydex	514	—	—	514
Contingent liabilities - Metabasis [4]	5,551	—	5,551	—
Liability for amounts owed to a former licensor	199	199	—	—
Total liabilities	$ 12,741	$ 199	$ 5,551	$ 6,991

(1) Short-term investments in marketable debt and equity securities are classified as available-for-sale securities based on management's intentions and are at level 2 of the fair value hierarchy, as these investment securities are valued based upon quoted prices for identical or similar instruments in markets that are not active, and model-based valuation techniques for which all significant assumptions are observable in the market. Short-term investments in mutual funds are valued at their net asset value (NAV) on the last day of the period. We have classified marketable securities with original maturities of greater than one year as

short-term investments based upon our ability and intent to use any and all of those marketable securities to satisfy the liquidity needs of our current operations. In addition, we have investment in warrants resulting from Seelos milestone payments that were settled in shares during the first quarter of 2019 and are at level 3 of the fair value hierarchy, based on black scholes value estimated by management as of December 31, 2019.

(2) Investment in Viking warrants, which we received as a result of Viking's partial repayment of the Viking note receivable and our purchase of Viking common stock and warrants in April 2016, is classified as level 1 as the fair value is determined using quoted market prices in active markets for the same securities. The change of the fair value is recorded in "Gain (loss) from Viking" in our consolidated statement of operations. See further discussion in "*Note (3), Investment in Viking.*"

(3) The fair value of Crystal contingent liabilities was determined using a probability weighted income approach. Most of the contingent payments are based on development or regulatory milestones as defined in the merger agreement with Crystal. The fair value is subjective and is affected by changes in inputs to the valuation model including management's estimates regarding the timing and probability of achievement of certain developmental and regulatory milestones. During the twelve months ended December 31, 2019, we paid $3.0 million contingent liability on development milestones to former Crystal shareholders. At December 31, 2019, $1.8 million of the development and regulatory milestones were considered to be achieved and will be paid to former Crystal shareholders during the first half of 2020.

(4) In connection with our acquisition of Metabasis in January 2010, we issued Metabasis stockholders four tradable CVRs, one CVR from each of four respective series of CVR, for each Metabasis share. The CVRs entitle Metabasis stockholders to cash payments as frequently as every six months as cash is received by us from proceeds from the sale or partnering of any of the Metabasis drug development programs, among other triggering events. The liability for the CVRs is determined using quoted prices in a market that is not active for the underlying CVR. The carrying amount of the liability may fluctuate significantly based upon quoted market prices and actual amounts paid under the agreements may be materially differ than the carrying amount of the liability. Several of the Metabasis drug development programs have been outlicensed to Viking, including VK2809. VK2809 is a novel selective TR-β agonist with potential in multiple indications, including hypercholesterolemia, dyslipidemia, NASH, and X-ALD. Under the terms of the agreement with Viking, we may be entitled to up to $375.0 million of development, regulatory and commercial milestones and tiered royalties on potential future sales including a $10.0 million payment upon initiation of a Phase 3 clinical trial. Another Metabasis drug development program, RVT-1502, has been outlicensed to Metavant. RVT-1502 is a novel, orally-bioavailable, small molecule, glucagon receptor antagonist or "GRA."

A reconciliation of the level 3 financial instruments as of December 31, 2019 is as follows (in thousands):

Liabilities		
Fair value of level 3 financial instruments as of December 31, 2018	$	6,991
Payments to CVR holders and other contingency payments		(3,050)
Fair value adjustments to contingent liabilities		(934)
Fair value of level 3 financial instruments as of December 31, 2019	$	3,007

Assets Measured on a Non-Recurring Basis

We apply fair value techniques on a non-recurring basis associated with valuing potential impairment losses related to our goodwill, indefinite-lived intangible assets, and long-lived assets.

We evaluate goodwill and indefinite-lived intangible assets annually for impairment and whenever circumstances occur indicating that goodwill might be impaired. We determine the fair value of our reporting unit based on a combination of inputs, including the market capitalization of Ligand, as well as Level 3 inputs such as discounted cash flows, which are not observable from the market, directly or indirectly. We determine the fair value of our indefinite-lived intangible assets using the income approach based on Level 3 inputs.

Other than a reduction in the value of our Selexis commercial license right disclosed in "*Note (1), Basis of Presentation and Summary of Significant Accounting Policies - Commercial license and other economic rights*" and a GRA intangible asset, there were no impairment of our goodwill, indefinite-lived assets, or long-lived assets recorded during the twelve months ended December 31, 2019.

Fair Value of Financial Instruments

In August 2014 and May 2018, we issued the 2019 Notes and 2023 Notes, respectively. We use quoted market rates in an inactive market, which are classified as a Level 2 input, to estimate the current fair value of our 2019 and 2023 Notes. The carrying value of the notes does not reflect the market rate. See "*Note (7), Convertible Senior Notes*" for additional information related to the fair value.

6. Leases

We lease certain office facilities and equipment primarily under various operating leases. Our leases have remaining contractual terms up toseven years, some of which include options to extend the leases for up to seven years. Our lease agreements do not contain any material residual value guarantees, material restrictive covenants, or material termination options. Our operating lease costs are primarily related to facility leases for administration offices and research and development facilities, and our finance leases are immaterial.

Lease assets and lease liabilities are recognized at the commencement of an arrangement where it is determined at inception that a lease exists. Lease assets represent the right to use an underlying asset for the lease term, and lease liabilities represent the obligation to make lease payments arising from the lease. These assets and liabilities are initially recognized based on the present value of lease payments over the lease term calculated using our incremental borrowing rate generally applicable to the location of the lease asset, unless the implicit rate is readily determinable. Lease assets also include any upfront lease payments made and lease incentives. Lease terms include options to extend or terminate the lease when it is reasonably certain that those options will be exercised.

In addition to base rent, certain of our operating leases require variable payments, such as insurance and common area maintenance. These variable lease costs, other than those dependent upon an index or rate, are expensed when the obligation for those payments is incurred. Leases with an initial term of 12 months or less are not recorded on the balance sheet, and the expense for these short-term leases and for operating leases is recognized on a straight-line basis over the lease term.

The depreciable life of lease assets and leasehold improvements is limited by the expected lease term, unless there is a transfer of title or purchase option reasonably certain of exercise.

Operating Lease Assets and Liabilities (in thousands):

		December 31, 2019	Balance Sheet Classification
Lease assets	$	10,353	Operating lease right-of-use assets
Current lease liabilities	$	(1,242)	Accrued liabilities
Non-current lease liabilities		(9,970)	Long-term operating lease liabilities
Total lease liabilities	$	(11,212)	

During the twelve months ended December 31, 2019, we entered into several new lease agreements including our San Diego headquarter expansion, opening new Las Vegas office and a new United Kingdom office lease, which resulted an increase in lease assets and liabilities of $6.1 million and $6.0 million, respectively.

Maturity of Operating Lease Liabilities (in thousands):

Maturity Dates		December 31, 2019
2020	$	1,914
2021		2,221
2022		2,261
2023		1,988
2024		1,989
Thereafter		3,493
Total lease payments		13,866
Less imputed interest		(2,654)
Present value of lease liabilities	$	11,212

As of December 31, 2019, our operating leases have a weighted-average remaining lease term of6 years and a weighted-average discount rate of6%. Cash paid for amounts included in the measurement of operating lease liabilities was $1.8 million for the twelve months ended December 31, 2019. Operating lease expense was $2.1 million (net of sublease income of $0.7 million) for the twelve months ended December 31, 2019, respectively.

7. Convertible Senior Notes

0.75% Convertible Senior Notes due 2019

In August 2014, we issued $245.0 million aggregate principal amount of 2019 Notes, resulting in net proceeds of $239.3 million. The implied estimated effective rate of the liability component of the 2019 Notes was 5.83%. The 2019 Notes are convertible into common stock at an initial conversion rate of 13.3251 shares per $1,000 principal amount of convertible notes, subject to adjustment upon certain events, which is equivalent to an initial conversion price of approximately $75.05 per share of common stock. The notes bear cash interest at a rate of 0.75% per year, payable semi-annually.

Holders of the 2019 Notes may convert the notes at any time prior to the close of business on the business day immediately preceding May 15, 2019, under any of the following circumstances:

(1) during any fiscal quarter (and only during such fiscal quarter) commencing after December 31, 2014, if, for at least 20 trading days (whether or not consecutive) during the 30 consecutive trading day period ending on the last trading day of the immediately preceding fiscal quarter, the last reported sale price of our common stock on such trading day is greater than 130% of the conversion price on such trading day;

(2) during the five business day period immediately following any 10 consecutive trading day period, in which the trading price per $1,000 principal amount of notes was less than 98% of the product of the last reported sale price of our common stock on such trading day and the conversion rate on each such trading day; or

(3) upon the occurrence of certain specified corporate events as specified in the indenture governing the notes.

On May 22, 2018, we entered into a supplemental indenture whereby we made an irrevocable election to settle the entire 2019 Notes in cash. As such, we would have been required to deliver cash to settle the principal and any premium due upon conversion. As a result of the requirement to deliver cash to settle any premium due upon conversion, on May 22, 2018, we reclassified from equity to liability the conversion option (a derivative) fair value of $341.6 million. In accordance with ASC 815, *Derivatives and Hedging*, the derivative was adjusted to its fair value as of December 31, 2018 to $23.4 million with the resulting $118.7 million increase, net of payments made, reflected in other expense, net, in our consolidated statements of operations for the year ended December 31, 2018.
In March and April 2018, we received notices for conversion of $21.8 million of principal amount of the 2019 Notes which were settled in May and June 2018. We paid the noteholders the conversion value of the notes in cash, up to the principal amount of the 2019 Notes. The excess of the conversion value over the principal amount, totaling $31.6 million, was paid in shares of common stock. In July and August 2018, we received notices for conversion of $195.9 million of principal amount of the 2019 Notes which were settled in October and November 2018. We paid the noteholders the $195.9 million principal amount and the excess of conversion value over the principal amount, totaling $439.6 million, in cash. The equity dilution and cash conversion premium payment upon conversion of the 2019 Notes was offset by the reacquisition of the shares and cash under the convertible bond hedge transactions entered into in connection with the offering of the 2019 Notes. As a result of the conversions, we recorded a $3.2 million loss on extinguishment of debt calculated as the difference between the estimated fair value of the debt and the carrying value of the 2019 Notes as of the settlement dates. To measure the fair value of the converted 2019 Notes as of the settlement dates, the applicable interest rates were estimated using Level 2 observable inputs and applied to the converted notes using the same methodology as in the issuance date valuation.

In June 2019, we received notices for conversion of $1.0 million of principal amount of the 2019 Notes, which were settled in cash upon the 2019 Notes' maturity date in August 2019. As a result, we paid the noteholders (1) the $1.0 million principal amount, and (2) the excess of conversion value over the principal portion in an amount of $0.5 million in cash.

On August 15, 2019, the 2019 Notes maturity date, we paid the noteholders the remaining $26.3 million principal amount and $11.9 million bond premium, which was classified as a derivative liability, in cash. We recorded the decrease in fair value of the derivative liability of $11.0 million in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2019.

Convertible Bond Hedge and Warrant Transactions

In August 2014, we entered into convertible bond hedges and sold warrants covering 3,264,643 shares of our common stock to minimize the impact of potential dilution to our common stock and/or offset the cash payments we were required to make in excess of the principal amount upon conversion of the 2019 Notes.

The convertible bond hedges had an exercise price of $75.05 per share and are exercisable when and if the 2019 Notes were converted. If upon conversion of the 2019 Notes, the price of our common stock was above the exercise price of the convertible bond hedges, the counterparties would have delivered shares of common stock and/or cash with an aggregate value approximately equal to the difference between the price of common stock at the conversion date and the exercise price, multiplied by the number of shares of common stock related to the convertible bond hedge transaction being exercised. The convertible bond hedges and warrants described below were separate transactions entered into by us and were not part of the terms of the 2019 Notes. Holders of the 2019 Notes and warrants did not have any rights with respect to the convertible bond hedges. We paid $48.1 million for these convertible bond hedges and recorded the amount as a reduction to additional paid-in capital.

As a result of the irrevocable cash election, conversion notices received relating to the 2019 Notes after May 22, 2018 must be fully settled in cash and amounts paid in excess of the principal amount would be offset by an equal receipt of cash under the convertible bond hedge. We have accounted for the bond hedge as a derivative asset and market it to market at the end of each reporting period. We reclassified from equity to derivative asset the remaining bond hedge fair value of $340.0 million and marked it to market as of December 31, 2018 to $22.6 million with the resulting $119.4 million increase, net of $471.2 million in payments received, reflected in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2018. Upon the 2019 Notes payoff on August 15, 2019, the bond hedge was settled, with the remaining $10.2 million fair value decrease reflected in other expense, net, in our consolidated statement of operations for the twelve months ended December 31, 2019.

Concurrently with the convertible bond hedge transactions, we entered into warrant transactions whereby we sold warrants to acquire 3,264,643 shares of common stock with an exercise price of $125.08 per share, subject to certain adjustments. The warrants have various expiration dates ranging from November 13, 2019 to April 22, 2020. The warrants will have a dilutive effect to the extent the market price per share of common stock exceeds the applicable exercise price of the warrants, as measured under the terms of the warrant transactions. We received $11.6 million for these warrants and recorded this amount to additional paid-in capital. The common stock issuable upon exercise of the warrants will be in unregistered shares, and we do not have the obligation and do not intend to file any registration statement with the SEC registering the issuance of the shares under the warrants. We continue to have the ability to avoid settling the warrants associated with the 2019 Notes in cash after May 22, 2018. Accordingly, the warrants continue to be classified in additional paid in capital.

In November 2018, we modified agreements with one of the bond hedge counterparties to cash settle a total of 525,000 warrants. As the modifications required the warrants to be cash settled, the fair value of the warrants was reclassified from stockholders' equity to a derivative liability on the modification dates, resulting in a $28.3 million deduction to additional paid-in-capital during 2018. We settled these repurchases for total consideration of $30.1 million and recorded a $1.8 million loss during 2018 on the change in the fair value of the derivative liabilities between their modification and settlement dates, which was included in other expense, net in the consolidated statement of operations for the twelve months ended December 31, 2018. As of December 31, 2019 and 2018, 1,890,359 and 2,739,643 warrants remain outstanding, respectively.

0.75% Convertible Senior Notes due 2023

In May 2018, we issued $750 million aggregate principal amount of 2023 Notes, bearing cash interest at a rate of 0.75% per year, payable semi-annually. The net proceeds from the offering, after deducting the initial purchasers' discount and offering expenses, were approximately $733.1 million. The 2023 Notes will be convertible into cash, shares of common stock, or a combination of cash and shares of common stock, at our election, based on an initial conversion rate, subject to adjustment, of 4.0244 shares per $1,000 principal amount of the 2023 Notes which represents an initial conversion price of approximately $248.48 per share.

Holders of the 2023 Notes may convert the notes at any time prior to the close of business on the business day immediately preceding November 15, 2022, under any of the following circumstances:

(1) during any fiscal quarter (and only during such fiscal quarter) commencing after September 30, 2018, if, for at least 20 trading days (whether or not consecutive) during the 30 consecutive trading day period ending on the last trading day of the immediately preceding fiscal quarter, the last reported sale price of our common stock on such trading day is greater than 130% of the conversion price on such trading day;

(2) during the five business day period immediately following any 10 consecutive trading day period, in which the trading price per $1,000 principal amount of notes was less than 98% of the product of the last reported sale price of our common stock on such trading day and the conversion rate on each such trading day; or

(3) upon the occurrence of certain specified corporate events as specified in the indenture governing the notes.

At the May 22, 2018 issuance date of the 2023 Notes, we did not have the necessary number of authorized but unissued shares of our common stock available to settle the conversion option of the 2023 Notes in shares. Therefore, in accordance with guidance found in ASC 815-15 – *Embedded Derivatives*, the conversion option of the Notes was deemed an embedded derivative requiring bifurcation from the 2023 Notes (host contract) and separate accounting as a derivative liability. The fair value of the conversion option derivative liability at May 22, 2018 was $144.0 million, which was recorded as a reduction to the carrying value of the debt. This debt discount is amortized to interest expense over the term of the debt using the effective interest method. Up to the date in which we received shareholder approval on June 19, 2018 to increase the authorized number of shares of our common stock, the conversion option was accounted for as a liability with the resulting change in fair value of $13.5 million during that period reflected in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2018. As of December 31, 2019, the debt discount remains and continues to be amortized to interest expense.

The notes will have a dilutive effect to the extent the average market price per share of common stock for a given reporting period exceeds the conversion price of $248.48. As of December 31, 2019, the "if-converted value" did not exceed the principal amount of the 2023 Notes.

In connection with the issuance of the 2023 Notes, we incurred $16.9 million of issuance costs, which primarily consisted of underwriting, legal and other professional fees. The portion of these costs allocated to the conversion option totaling $3.2 million was recorded as interest expense for the twelve months ended December 31, 2018. The portion of these costs allocated to the liability component totaling $13.7 million is amortized to interest expense using the effective interest method over the five year expected life of the 2023 Notes.

It is our intent and policy to settle conversions through combination settlement, which essentially involves payment in cash equal to the principal portion and delivery of shares of common stock for the excess of the conversion value over the principal portion.

Convertible Bond Hedge and Warrant Transactions

In conjunction with the 2023 Notes, in May 2018, we entered into convertible bond hedges and sold warrants covering 3,018,327 shares of our common stock to minimize the impact of potential dilution to our common stock and/or offset the cash payments we are required to make in excess of the principal amount upon conversion of the 2023 Notes. The convertible bond hedges have an exercise price of $248.48 per share and are exercisable when and if the 2023 Notes are converted. We paid $140.3 million for these convertible bond hedges. If upon conversion of the 2023 Notes, the price of our common stock is above the exercise price of the convertible bond hedges, the counterparties will deliver shares of common stock and/or cash with an aggregate value approximately equal to the difference between the price of common stock at the conversion date and the exercise price, multiplied by the number of shares of common stock related to the convertible bond hedge transaction being exercised. The convertible bond hedges and warrants described below are separate transactions entered into by us and are not part of the terms of the 2023 Notes. Holders of the 2023 Notes and warrants will not have any rights with respect to the convertible bond hedges.

Concurrently with the convertible bond hedge transactions, we entered into warrant transactions whereby we sold warrants covering 3,018,327 shares of common stock with an exercise price of $315.38 per share, subject to certain adjustments. We received $90.0 million for these warrants. The warrants have various expiration dates ranging from August 15, 2023 to February 6, 2024. The warrants will have a dilutive effect to the extent the market price per share of common stock exceeds the applicable exercise price of the warrants, as measured under the terms of the warrant transactions. The common stock issuable upon exercise of the warrants will be in unregistered shares, and we do not have the obligation and do not intend to file any registration statement with the SEC registering the issuance of the shares under the warrants.

For the period from May 22, 2018, the issuance date of the bond hedge and warrant transactions, to June 19, 2018, the date shareholders approved an increase in our authorized shares of common stock, the bond hedges and warrants required cash settlement and were accounted for as a derivative asset and liability, respectively, with the resulting increase in fair value of $19.2 million and $7.5 million reflected in other expense, net, in our consolidated statements of operations for twelve months ended December 31, 2018.

The following table summarizes information about the equity and liability components of the 2019 Notes and 2023 Notes (in thousands).

	December 31, 2019	December 31, 2018
Principle amount of 2019 Notes outstanding	$ —	$ 27,326
Unamortized discount (including unamortized debt issuance cost)	—	(893)
Total current portion of notes payable	$ —	$ 26,433
Principle amount of 2023 Notes outstanding	$ 750,000	$ 750,000
Unamortized discount (including unamortized debt issuance cost)	(111,041)	(140,136)
Total long-term portion of notes payable	$ 638,959	$ 609,864
Carrying value of equity component of 2023 Notes	$ 101,422	$ 127,997
Fair value of convertible senior notes outstanding (Level 2)	$ 647,280	$ 713,533

As of December 31, 2019, there were no events of default or violation of any covenants under our financing obligations.

8. Balance Sheet Account Details

Short-term Investments

The following table summarizes the various investment categories at December 31, 2019 and 2018 (in thousands):

	Cost	Gross unrealized gains	Gross unrealized losses	Estimated fair value
December 31, 2019				
Short-term investments				
Bank deposits	$ 411,690	$ 188	$ (3)	$ 411,875
Corporate bonds	63,818	161	—	63,979
Corporate equity securities	4,506	416	(1,850)	3,072
Commercial paper	210,525	43	(16)	210,552
Warrants	—	125	—	125
Mutual fund	250,635	—	(249)	250,386
	$ 941,174	$ 933	$ (2,118)	$ 939,989
December 31, 2018				
Short-term investments				
Bank deposits	$ 311,066	$ 26	$ (29)	$ 311,063
Corporate bonds	53,223	1	(45)	53,179
Corporate equity securities	135	1,191	—	1,326
Commercial paper	225,731	8	(76)	225,663
U.S. Government bonds	7,982	—	(9)	7,973
Municipal bonds	2,017	—	(4)	2,013
	$ 600,154	$ 1,226	$ (163)	$ 601,217

Property and equipment are stated at cost and consists of the following (in thousands):

	December 31,	
	2019	2018
Lab and office equipment	$ 6,307	$ 4,183
Leasehold improvements	2,729	2,418
Computer equipment and software	999	936
	10,035	7,537
Less accumulated depreciation and amortization	(2,850)	(2,165)
	$ 7,185	$ 5,372

Depreciation of equipment is computed using the straight-line method over the estimated useful lives of the assets which range from three to ten years. Leasehold improvements are amortized using the straight-line method over their estimated useful lives or their related lease term, whichever is shorter. Depreciation expense of $1.5 million, $0.9 million, and $0.4 million was recognized for the twelve months ended ended December 31, 2019, 2018, and 2017, respectively, and was included in operating expenses.

Goodwill and identifiable intangible assets consist of the following (in thousands):

	As of December 31,	
	2019	2018
Indefinite lived intangible assets		
Goodwill	$ 95,229	$ 86,646
Definite lived intangible assets		
Complete technology	242,813	235,413
Less: Accumulated amortization[1]	(50,203)	(35,070)
Trade name	2,642	2,642
Less: Accumulated amortization	(1,180)	(1,048)
Customer relationships	29,600	29,600
Less: Accumulated amortization	(13,224)	(11,744)
Total goodwill and other identifiable intangible assets, net	$ 305,677	$ 306,439

(1) Accumulated amortization for complete technology includes immaterial amount of foreign currency translation adjustments for the complete technology acquired from the Vernalis acquisition.

Amortization of finite lived intangible assets is computed using the straight-line method over the estimated useful life of the asset of 20 years. Amortization expense of $16.9 million, $15.8 million, and $12.1 million was recognized for the years ended December 31, 2019 and 2018, and 2017, respectively. Estimated amortization expense for the years ending December 31, 2020 through 2024 is $14.1 million per year. For each of the years ended December 31, 2019, 2018, and 2017, there wasno material impairment of intangible assets with finite lives.

Accrued liabilities consist of the following (in thousands):

	December 31,	
	2019	2018
Compensation	$ 1,986	$ 4,045
Legal	1,135	942
Amounts owed to former licensees	381	428
Royalties owed to third parties	—	1,025
Payments due to broker for share repurchases	—	4,613
Return reserve	3,027	3,590
Restructuring	—	1,093
Current operating lease liabilities	1,242	—
Other	2,065	3,464
	$ 9,836	$ 19,200

Contingent liabilities:

In connection with the acquisition of CyDex in January 2011, we issued a series of CVRs and also assumed certain contingent liabilities. We may be required to make additional payments upon achievement of certain clinical and regulatory milestones to the CyDex shareholders and former license holders.

In connection with the acquisition of Metabasis in January 2010, we entered into four CVR agreements with Metabasis shareholders. The CVRs entitle the holders to cash payments as frequently as every six months as proceeds are received by us

upon the sale or licensing of any of the Metabasis drug development programs and upon the achievement of specified milestones.

In connection with the acquisition of Crystal in October 2017, we entered into contingent liabilities based on achievement of certain research and business milestones as well as certain revenue goal. See "*Note (4), Business Combinations*" for more information.

The following table summarizes rollfoward of contingent liabilities as of December 2019 and 2018 (in thousands):

	December 31, 2017	Payments	Fair Value Adjustment	December 31, 2018	Payments	Fair Value Adjustment	Repurchases	December 31, 2019
Cydex	$ 1,589	$ (25)	$ (1,050)	$ 514	$ (50)	$ (116)	$ —	$ 348
Metabasis	3,971	(3,860)	5,440	5,551	—	904	(520)	5,935
Crystal	8,401	(1,000)	(924)	6,477	(3,000)	(818)	—	2,659
Total	**$ 13,961**	**$ (4,885)**	**$ 3,466**	**$ 12,542**	**$ (3,050)**	**$ (30)**	**$ (520)**	**$ 8,942**

9. Stockholders' Equity

Share-based Compensation Expense

The following table summarizes share-based compensation expense (in thousands):

	December 31,		
	2019	2018	2017
Share-based compensation expense as a component of:			
Research and development expenses	$ 9,641	$ 8,352	$ 14,235
General and administrative expenses	14,874	12,494	10,680
	$ 24,515	$ 20,846	$ 24,915

Stock Plans

In June 2019, our 2002 Stock Incentive Plan was amended to increase the number of shares available for issuance by 0.8 million shares. As of December 31, 2019, there were 0.9 million shares available for future option grants or direct issuance under the Amended 2002 Plan.

Following is a summary of our stock option plan activity and related information:

	Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term in Years	Aggregate Intrinsic Value (In thousands)
Balance at December 31, 2018	1,736,304	$ 66.71	5.47	$ 125,858
Granted	338,617	$ 116.69		
Exercised	(112,011)	$ 23.65		
Forfeited	(6,531)	$ 139.37		
Balance at December 31, 2019	1,956,379	$ 77.54	5.45	72,002
Exercisable at December 31, 2019	1,454,726	$ 61.82	4.42	70,345
Options vested and expected to vest as of December 31, 2019	1,956,379	$ 77.54	5.45	$ 72,002

The weighted-average grant-date fair value of all stock options granted during 2019, 2018 and 2017 was $48.65, $58.85 and $53.17 per share, respectively. The total intrinsic value of all options exercised during 2019, 2018 and 2017 was approximately $10.4 million, $51.9 million and $13.3 million, respectively.

Cash received from options exercised, net of fees paid, in 2019, 2018 and 2017 was $2.6 million, $19.8 million and $4.7 million, respectively.

Following is a further breakdown of the options outstanding as of December 31, 2019:

Range of exercise prices	Options outstanding	Weighted average remaining life in years	Weighted average exercise price	Options exercisable	Weighted average exercise price
$9.96 - $12.81	195,148	1.01	$10.25	195,148	$10.25
$14.47	212,116	2.11	$14.47	198,116	$14.47
$21.92	195,955	3.13	$21.92	195,955	$21.92
$32.00 - $74.42	374,059	4.43	$63.72	374,059	$63.72
$85.79 - $100.38	301,459	6.66	$93.41	239,220	$92.25
$101.15 - $113.76	98,112	7.98	$109.91	46,066	$107.65
$117.97	272,687	9.12	$117.97	56,830	$117.97
$119.30 - $159.01	282,475	8.01	$151.55	129,541	$149.80
$159.81 - $171.28	7,050	8.52	$166.40	2,473	$164.90
$195.91	17,318	8.47	$195.91	17,318	$195.91
	1,956,379	5.45	$77.54	1,454,726	$61.82

The assumptions used for the specified reporting periods and the resulting estimates of weighted-average grant date fair value per share of options granted:

	Year Ended December 31,		
	2019	2018	2017
Risk-free interest rate	1.4%-2.6%	2.7%-3.0%	2.0%-2.2%
Expected volatility	40%-49%	33%-36%	43%-47%
Expected term	4.6 to 5.9 years	5.1 to 5.8 years	6.5 to 6.8 years

As of December 31, 2019, there was $23.2 million of total unrecognized compensation cost related to non-vested stock options. That cost is expected to be recognized over a weighted average period of 2.4 years.

Restricted Stock Activity

The following is a summary of our restricted stock activity and related information:

	Shares	Weighted-Average Grant Date Fair Value
Outstanding at December 31, 2018	132,273	$130.63
Granted	118,498	$115.90
Vested	(102,846)	$121.55
Forfeited	(666)	$134.36
Outstanding at December 31, 2019	147,259	$125.11

As of December 31, 2019, unrecognized compensation cost related to non-vested stock awards amounted to $11.2 million. That cost is expected to be recognized over a weighted average period of 1.5 years.

Employee Stock Purchase Plan

As of December 31, 2019, 59,263 shares of our common stock are available for future issuance under the Amended Employee Stock Purchase Plan, or ESPP. The ESPP permits eligible employees to purchase up to 1,250 shares of Ligand common stock per calendar year at a discount through payroll deductions. The price at which stock is purchased under the ESPP is equal to

85% of the fair market value of the common stock on the first of a six month offering period or purchase date, whichever is lower. There were 4,745, 3,386 and 3,061 shares issued under the ESPP in 2019, 2018 and 2017, respectively.

Share Repurchases

In May 2018, in conjunction with our 2023 Notes debt offering, we repurchased 260,000 shares of our common stock at a cost of $191.14 per share. In September 2018, the board of directors authorized us to repurchase up to $200.0 million of our common stock from time to time over a period of up to three years (the "Repurchase Program"). On January 23, 2019, the board of directors elected to increase the Repurchase Program, authorizing us to repurchase up to a maximum of $350.0 million of our outstanding common stock under the Repurchase Program.

On September 11, 2019, our Board of Directors approved a stock repurchase program authorizing the repurchase of up to $500.0 million of our common stock from time to time over the next three years. We expect to acquire shares primarily through open-market transactions and have entered into a Rule 10b5-1 trading plan, and may enter into additional Rule 10b5-1 trading plans in the future, to facilitate open-market repurchases. The timing and amount of repurchase transactions will be determined by management based on our evaluation of market conditions, share price, legal requirements and other factors. Our prior $350.0 million stock repurchase program mentioned above was terminated in connection with the approval of the new stock repurchase program. Authorization to repurchase $326.8 million of our common stock remained available as of December 31, 2019.

During the twelve months ended December 31, 2019, 2018 and 2017, we repurchased 4,122,133 shares for $448.4 million, 782,248 shares for $127.5 million, and 14,000 shares for $2.0 million, respectively.

10. Commitment and Contingencies: Legal Proceedings

We record an estimate of a loss when the loss is considered probable and estimable. Where a liability is probable and there is a range of estimated loss and no amount in the range is more likely than any other number in the range, we record the minimum estimated liability related to the claim in accordance with *ASC 450, Contingencies.* As additional information becomes available, we assess the potential liability related to our pending litigation and revises our estimates. Revisions in our estimates of potential liability could materially impact our results of operations.

On July 27, 2018, AG Oncon, LLC, AG Ofcon, Ltd., Calamos Market Neutral Income Fund, Capital Ventures International, Citadel Equity Fund Ltd., Opti Opportunity Master Fund, Polygon Convertible Opportunity Master Fund, Wolverine Flagship Fund Trading Limited, as plaintiffs, filed a complaint in the Court of Chancery of the State of Delaware (AG Oncon, LLC v. Ligand Pharmaceuticals Inc.) alleging claims for violation of the Trust Indenture Act, breach of contract, and others against us. On May 24, 2019, the Court granted our motion to dismiss and the Delaware Supreme Court subsequently affirmed the decision of the Court of Chancery dismissing this case with prejudice.

In November 2017, CyDex, our wholly-owned subsidiary, received a Paragraph IV certification Notice Letter from Teva stating that Teva had submitted an ANDA to the FDA, seeking approval to manufacture, offer to sell, and sell a generic version of EVOMELA® prior to the expiration of any of U.S. Patent Nos. 8,410,077 ("the '077 patent"); 9,200,088 ("the '088 patent"), or 9,493,582 ("the '582 patent"), and alleging that these patents, each of which relates to Captisol®, are invalid, unenforceable, and/or will not be infringed by Teva's ANDA product. On December 20, 2017, CyDex filed a complaint against Teva in the U.S. District Court for the District of Delaware, asserting that the filing of Teva's ANDA constitutes infringement of each of the '077 patent, the '088 patent, and the '582 patent. On March 22, 2018, Teva filed an answer and counterclaims seeking declarations of non-infringement and invalidity as to each of the asserted patents and, on April 12, 2018, CyDex filed an answer to Teva's counterclaims. On October 31, 2019, CyDex, Teva, and Acrotech Biopharma L.L.C. (the holder of the NDA for EVOMELA®) entered into a Confidential Settlement Agreement, settling this patent litigation. As a result of the settlement, Teva will be permitted to market a generic version of EVOMELA® in the United States on June 1, 2026 or earlier under certain circumstances. The terms of the settlement agreement are otherwise confidential.

On April 9, 2019, CyDex received a Paragraph IV certification Notice Letter from Alembic Global Holdings SA ("Alembic") stating that Alembic had submitted an ANDA to the FDA, seeking approval to manufacture, offer to sell, and sell a generic version of EVOMELA® prior to the expiration of any of the '077 patent; the '088 patent, the '582 patent, or U.S. Patent No. 10,040,872 ("the '872 patent"), and alleging that these patents, each of which relates to Captisol®, are invalid, unenforceable, and/or would not be infringed by Alembic's ANDA product. On May 23, 2019, CyDex filed a complaint against Alembic, Alembic Pharmaceuticals, Ltd., and Alembic Pharmaceuticals, Inc. in the U.S. District Court for the District of Delaware, asserting that the filing of Alembic's ANDA constitutes infringement of each of the '088 patent and the '582 patent. On July

29, 2019, Alembic filed an answer and counterclaims seeking declarations of non-infringement and invalidity as to each of the asserted patents and, on August 19, 2019, CyDex filed an answer to Alembic's counterclaims. On December 16, 2019, the Court entered a Scheduling Order, setting October 2, 2020, as the fact discovery cut off, March 5, 2021, as the close of expect discovery, and May 17, 2021, as the first day of a five to six day bench trial.

On September 16, 2019, CyDex received a Paragraph IV certification Notice Letter from Lupin Ltd. ("Lupin") stating that Lupin had submitted an ANDA to the FDA, seeking approval to manufacture, offer to sell, and sell a generic version of EVOMELA® prior to the expiration of any of the '077 patent; the '088 patent, the '582 patent, or the '872 patent, and alleging that these patents, each of which relates to Captisol®, are invalid, unenforceable, and/or would not be infringed by Lupin's ANDA product. CyDex filed a complaint on October 29, 2019, alleging patent infringement against Lupin. Lupin filed an answer on December 11, 2019 and counterclaimed for declaratory judgments of invalidity and non-infringement as to all four patents and CyDex filed its answer to Lupin's counterclaims on January 2, 2020.

On October 31, 2019, we received three civil complaints filed in the US District Court for the Northern District of Ohio on behalf of several Indian tribes. The Northern District of Ohio is the Court that the Judicial Panel on Multi-District Litigation ("JPML") has assigned several hundred civil cases which have been designated as a Multi-District Litigation ("MDL") and captioned In Re: National Prescription Opiate Litigation. The allegations in these complaints focus on the activities of defendants other than the company and no individualized factual allegations have been advanced against us in any of the three complaints. We reject all claims raised in the complaints and intend to vigorously defend these matters.

11. Income Taxes

The Tax Act was enacted on December 22, 2017 and includes a number of changes to existing tax laws that impact us, most notably it reduces the US federal corporate tax rate from 35% to 21%, for tax years beginning after December 31, 2017. The Tax Act made modifications to allowable tax depreciation, the deductability of compensation for officers, the deductibility of meals and entertainment expenses, and the deductibility of interest expense.

The components of the income tax expense (benefit) for continuing operations are as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Current expense (benefit):			
Federal	$ 89,471	$ —	$ —
State	3,103	424	111
Foreign	(66)	(158)	261
	92,508	266	372
Deferred expense (benefit):			
Federal	74,627	29,928	44,075
State	202	(185)	228
	$ 167,337	$ 30,009	$ 44,675

A reconciliation of income tax expense (benefit) from continuing operations to the amount computed by applying the statutory federal income tax rate to the net income (loss) from continuing operations is summarized as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Tax at federal statutory rate	$ 167,294	$ 36,400	$ 20,031
State, net of federal benefit	2,466	1,635	622
Contingent liabilities	18	948	903
Share-based compensation	(819)	(8,131)	(4,019)
FDII	(402)	—	—
Research and development credits	(879)	(2,758)	(2,821)
Change in uncertain tax positions	441	858	1,308
Rate change for changes in federal or state law	(210)	178	32,429
Change in valuation allowance	(1,193)	(4,225)	(4,169)
Expired NOLs and credits	—	3,054	—
Change in derivatives	—	615	—
Other	621	1,435	391
	$ 167,337	$ 30,009	$ 44,675

We remeasured certain deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future, which is generally 21%. Significant components of our deferred tax assets and liabilities as of December 31, 2019 and 2018 are shown below. We assess the positive and negative evidence to determine if sufficient future taxable income will be generated to use the existing deferred tax assets. Our evaluation of evidence resulted in management concluding that the majority of our deferred tax assets will be realized. However, we maintain a valuation allowance to offset certain net deferred tax assets as management believes realization of such assets are uncertain as of December 31, 2019, 2018 and 2017. The valuation allowance increased $136.9 million in 2019, decreased $2.5 million in 2018 and decreased $8.4 million in 2017.

We offset all deferred tax assets and liabilities by jurisdiction, as well as any related valuation allowance, and present them on our consolidated balance sheet as a non-current deferred income tax asset or liability (as applicable). Deferred tax assets (liabilities) are comprised of the following:

	December 31,	
	2019	2018
	(in thousands)	
Deferred tax assets:		
Net operating loss carryforwards	$ 150,727	$ 57,181
Research credit carryforwards	14,843	31,101
Fixed assets and intangibles	419	1,637
Accrued expenses	171	657
Deferred revenue	—	957
Other	17,960	11,430
	184,120	102,963
Valuation allowance for deferred tax assets	(141,338)	(4,476)
Net deferred tax assets	$ 42,782	$ 98,487
Deferred tax liabilities:		
Retrophin fair value adjustment	(18)	(179)
Convertible debt	—	(2,905)
Identified intangibles	(41,664)	(44,643)
Identified indefinite lived intangibles	(1,040)	(1,759)
Investment in Viking	(2,937)	(2,480)
Deferred revenue	(3,488)	—
Other	(964)	—
Net deferred tax liabilities	$ (50,111)	$ (51,966)
Deferred income taxes, net	$ (7,329)	$ 46,521

As of December 31, 2019, we had federal net operating loss carryforwards set to expire through 2037 of $1.5 million and $119.1 million of state net operating loss carryforwards that begin to expire in 2028. We also have $0.6 million of federal research and development credit carryforwards, which expire through 2038. We have $22.9 million of California research and development credit carryforwards that have no expiration date. In addition, we have approximately $713.8 million of non-U.S. net operating loss carryovers and approximately $14.6 million of non-U.S. capital loss carryovers that have no expiration date. We have a full valuation allowance against these non-U.S. tax attributes.

Pursuant to Section 382 and 383 of the Internal Revenue Code of 1986, as amended, utilization of our net operating losses and credits may be subject to annual limitations in the event of any significant future changes in its ownership structure. These annual limitations may result in the expiration of net operating losses and credits prior to utilization. The deferred tax assets as of December 31, 2019 are net of any previous limitations due to Section 382 and 383.

We account for income taxes by evaluating a probability threshold that a tax position must meet before a financial statement benefit is recognized. The minimum threshold is a tax position that is more likely than not to be sustained upon examination by the applicable taxing authority, including resolution of any related appeals or litigation processes, based on the technical merits of the position. Our remaining liabilities for uncertain tax positions are presented net of the deferred tax asset balances on the accompanying consolidated balance sheet.

A reconciliation of the amount of unrecognized tax benefits at December 31, 2019, 2018 and 2017 is as follows (in thousands):

	December 31,		
	2019	2018	2017
Balance at beginning of year	$ 30,289	$ 29,363	$ 38,770
Additions based on tax positions related to the current year	543	1,247	1067
Additions for tax positions of prior years	(54)	336	109
Reductions for tax positions of prior years	(2,042)	(657)	(10,583)
Balance at end of year	$ 28,736	$ 30,289	$ 29,363

Included in the balance of unrecognized tax benefits at December 31, 2019 is $27.1 million of tax benefits that, if recognized would impact the effective rate. There are no positions for which it is reasonably possible that the uncertain tax benefit will significantly increase or decrease within twelve months.

We recognize interest and penalties related to uncertain tax positions in income tax expense. As of December 31, 2019 and December 31, 2018, we recognized an immaterial amount of interest and penalties. We file income tax returns in the United States, various state jurisdictions, United Kingdom, and Canada with varying statutes of limitations. The federal statute of limitation remains open for the 2016 tax year to the present. The state income tax returns generally remain open for the 2015 tax year through the present. Net operating loss and research credit carryforwards arising prior to these years are also open to examination if and when utilized.

We are subject to taxation in the U.S. and various states and foreign jurisdictions. With few exceptions, as of December 31, 2019, we are no longer subject to state, local or foreign examinations by tax authorities for tax years before 2015 and we are no longer subject to U.S. federal income or payroll tax examinations for tax years before 2017. No tax returns are currently under examination by any tax authorities. Net operating loss and research credit carryforwards arising prior to these years are also open to examination if and when utilized. We believe our reserve for unrecognized tax benefits and contingent tax issues is adequate with respect to all open years.

12. Summary of Unaudited Quarterly Financial Information

The following financial information reflects all normal recurring adjustments, which are, in the opinion of management, necessary for a fair statement of the results and cash flows of interim periods. Summarized quarterly data for 2019 and 2018 are as follows (in thousands, except per share amounts):

	First Quarter*	Second Quarter	Third Quarter	Fourth Quarter
2019				
Total revenues	$ 43,484	$ 24,987	$ 24,808	$ 27,003
Total operating costs and expenses	29,738	29,117	29,966	37,182
Income tax (expense) benefit	(176,376)	3,609	4,620	810
Net income (loss)	666,337	(14,419)	(15,251)	(7,365)
Basic per share amounts:				
Net income (loss)	$ 32.59	$ (0.74)	$ (0.81)	$ (0.43)
Diluted per share amounts:				
Net income (loss)	$ 31.32	$ (0.74)	$ (0.81)	$ (0.43)
Weighted average shares—basic	20,447	19,558	18,770	17,243
Weighted average shares—diluted	21,277	19,558	18,770	17,243

*includes pre-tax gain from sale of Promacta license of $812,797.

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2018				
Total revenues	$ 56,157	$ 90,043	$ 45,663	$ 59,590
Total operating costs and expenses	19,116	19,868	22,301	26,441
Income tax (expense) benefit	(10,033)	(22,419)	(11,864)	14,307
Net income (loss)	45,279	73,160	67,362	(42,482)
Basic per share amounts:				
Net income (loss)	$ 2.13	$ 3.45	$ 3.19	$ (2.02)
Diluted per share amounts:				
Net income (loss)	$ 1.83	$ 2.99	$ 2.80	$ (2.02)
Weighted average shares—basic	21,209	21,212	21,148	21,071
Weighted average shares—diluted	24,800	24,438	24,052	21,071

13. Subsequent Event

On February 11, 2020, we announced the signing of an agreement to acquire the core assets, partnered programs and ion channel technology from Icagen for $5 million in cash. Icagen will also be entitled to receive up to an additional $25 million of cash payments based on certain revenue achievements. The transaction is subject to certain closing conditions, including a vote of Icagen stockholders, and is expected to close in April 2020.

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

None.

Item 9A. Controls and Procedures

(a) Evaluation of Disclosure Controls and Procedures

We are responsible for maintaining disclosure controls and procedures designed to provide reasonable assurance that information required to be disclosed in reports we file under the Exchange Act is recorded, processed, summarized and reported within the specified time periods and accumulated and communicated to management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure. The design of any system of controls is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected. As of the end of the period covered by this Annual Report on Form 10-K, we have carried out an evaluation, under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, of the effectiveness of our disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, and have concluded our disclosure controls and procedures were effective at a reasonable assurance level as of December 31, 2019.

There have been no changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

(b) Management's Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting for the Company. Internal control over financial reporting is a process to provide reasonable assurance regarding the reliability of our financial reporting for external purposes in accordance with accounting principles generally accepted in the United States of America. Internal control over financial reporting includes maintaining records that in reasonable detail accurately and fairly reflect our transactions; providing reasonable assurance that transactions are recorded as necessary for preparation of our financial statements in accordance with generally accepted accounting principles; providing reasonable assurance that receipts and expenditures are made in accordance with our management and directors; and providing reasonable assurance that
unauthorized acquisition, use or disposition of company assets that could have a material effect on our financial statements would be prevented or detected on a timely basis. Because of its inherent limitations, internal control over financial reporting is not intended to provide absolute assurance that a misstatement of our financial statements would be prevented or detected.

Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework established by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) as set forth in the 2013 Internal Control-Integrated Framework. Based on our evaluation under the 2013 framework in Internal Control - Integrated Framework, management concluded that our internal controls over financial reporting were effective as of December 31, 2019.

Ernst & Young LLP, an independent registered public accounting firm, has audited the Company's consolidated financial statements included in this Annual Report on Form 10-K and has issued an attestation report, included herein, on the effectiveness of our internal control over financial reporting as of December 31, 2019.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Ligand Pharmaceuticals Incorporated

Opinion on Internal Control Over Financial Reporting

We have audited Ligand Pharmaceuticals Incorporated's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Ligand Pharmaceuticals Incorporated (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, and the related notes and our report dated February 27, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

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

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

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

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ Ernst & Young LLP

San Diego, California
February 27, 2020

Item 9B. Other Information

None.

Part III

Item 10. Directors, Executive Officers and Corporate Governance

Code of Conduct

The Board of Directors has adopted a Code of Conduct and Ethics Policy ("Code of Conduct") that applies to all officers, directors and employees. The Company will promptly disclose (1) the nature of any amendment to the Code of Conduct that applies to our principal executive officer, principal financial officer, principal accounting officer or controller or persons performing similar functions and (2) the nature of any waiver, including an implicit waiver, from a provision of our Code of Conduct that is granted to one of these specified officers, the name of such person who is granted the waiver and the date of the waiver on our website in the future. The Code of Conduct can be accessed via our website (http://www.ligand.com), Corporate Overview page. You may also request a free copy by writing to: Investor Relations, Ligand Pharmaceuticals Incorporated, 3911 Sorrento Valley Blvd, Suite 110, San Diego, CA 92121.

The other information under Item 10 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2019.

Item 11. Executive Compensation

Item 11 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2019.

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

Item 12 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2019.

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

Item 13 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2019.

Item 14. Principal Accountant Fees and Services

Item 14 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2019.

PART IV

Item 15. Exhibits and Financial Statement Schedule

(a) The following documents are included as part of this Annual Report on Form 10-K.

(1) Financial statements

(2) Schedules not included herein have been omitted because they are not applicable or the required information is in the consolidated financial statements or notes thereto.

(3) The following exhibits are filed as part of this Form 10-K and this list includes the Exhibit Index.

		Incorporated by Reference				
Exhibit Number	**Description of Exhibit**	**Form**	**File Number**	**Date of Filing**	**Exhibit Number**	**Filed Herewith**
2.1	Agreement and Plan of Merger, dated as of December 17, 2015, by and among Ligand Pharmaceuticals Incorporated, Open Monoclonal Technology, Inc., OMT, LLC, Schrader 1 Acquisition, Inc., Schrader 2 Acquisition, Inc. and Fortis Advisors LLC	8-K	001-33093	December 18, 2015	2.1	
2.2	Rule 2.7 Announcement issued by Ligand Holdings UK Ltd., dated August 9, 2018	8-K	001-33093	August 9, 2018	2.1	
2.3	Asset Purchase Agreement, dated March 5, 2019, by and among Ligand Pharmaceuticals Incorporated and RPI Financial Trust	8-K	001-33093	March 5, 2019	2.1	
3.1	Amended and Restated Certificate of Incorporation of the Company.	S-4	333-58823	July 9, 1998	3.1	
3.2	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of the Company, dated June 14, 2000	10-K	0-20720	March 29, 2001	3.5	
3.3	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of the Company, dated June 30, 2004	10-Q	0-20720	August 5, 2004	3.6	
3.4	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of the Company, dated November 17, 2010	8-K	001-33093	November 19, 2010	3.1	
3.5	Certificate of Amendment of the Amended and Restated Certification of Incorporation of the Company, dated June 19, 2018	S-8	333-233130	August 8, 2019	3.6	
3.6	Third Amended and Restated Bylaws of the Company	8-K	001-33093	September 10, 2015	3.1	
4.1	Specimen stock certificate for shares of the common stock of the Company	10-K	001-33093	March 1, 2018	4.1	
4.2	Indenture, dated as of May 22, 2018, between the Company and Wilmington Trust, National Association, as trustee, including the form of 0.75% Convertible Senior Notes due 2023	8-K	001-33093	May 22, 2018	4.1	
4.3	Description of Registered Securities					X
10.1#	2002 Stock Incentive Plan (as amended and restated through June 6, 2019)	DEF	001-33093	April 24, 2019	Appendix A	

10.2#	2002 Employee Stock Purchase Plan (as amended and restated effective June 6, 2019)	DEF	001-33093	April 24, 2019	Appendix B	
10.3#	Form of Stock Option Grant Notice and Stock Option Agreement under the Company's 2002 Stock Incentive Plan	10-K	001-33093	February 24, 2014	10.5	
10.4#	Form of Stock Issuance Agreement for non-employee directors under the Company's 2002 Stock Incentive Plan	S-1	333-131029	January 13, 2006	10.289	
10.5#	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement under the Company's 2002 Stock Incentive Plan	10-K	001-33093	March 1, 2018	10.6	
10.6#	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement under the Company's 2002 Stock Incentive Plan - Performance-Based RSU Form	10-K	001-33093	March 1, 2018	10.7	
10.7#	Form of Executive Officer Change in Control Severance Agreement	8-K	001-33093	August 22, 2007	10.1	
10.8#	Amended and Restated Severance Plan, dated December 20, 2008	8-K	001-33093	December 24, 2008	10.2	
10.9#	Amended and Restated Director Compensation and Stock Ownership Policy, effective March 28, 2019					X
10.10	TR Beta Contingent Value Rights Agreement, dated January 27, 2010, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 28, 2010	10.2	
10.11	Glucagon Contingent Value Rights Agreement, dated January 27, 2010, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 28, 2010	10.3	
10.12	General Contingent Value Rights Agreement, dated January 27, 2010, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 28, 2010	10.4	
10.13	Amendment of General Contingent Value Rights Agreement, dated January 26, 2011, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 31, 2011	10.1	
10.14	Amendment of General Contingent Value Rights Agreement dated May 20, 2014 among the Company, Metabasis Therapeutics, Inc., David F. Hale and Computershare Inc.	8-K	001-33093	May 22, 2014	10.1	
10.15	Amendment of TR Beta Contingent Value Rights Agreement dated May 20, 2014 among the Company, Metabasis Therapeutics, Inc., David F. Hale and Computershare, Inc.	8-K	001-33093	May 22, 2014	10.2	
10.16†	Captisol® Supply Agreement, dated December 20, 2002, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited and Hovione International Limited	10-K	001-33093	March 3, 2011	10.1	
10.17†	1st Amendment to Captisol® Supply Agreement, dated July 29, 2005, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited and Hovione International Limited	10-K	001-33093	March 3, 2011	10.101	
10.18	2nd Amendment to Captisol® Supply Agreement, dated March 1, 2007, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited, and Hovione International Limited	10-K	001-33093	March 3, 2011	10.102	
10.19†	3rd Amendment to Captisol® Supply Agreement, dated January 25, 2008, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited, and Hovione International Limited	10-K	001-33093	March 3, 2011	10.103	
10.20†	4th Amendment to Captisol® Supply Agreement, dated September 28, 2009, among CyDex Pharmaceuticals, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited and Hovione International Limited	10-K	001-33093	March 3, 2011	10.104	

10.21†	License Agreement, dated September 3, 1993, between CyDex L.C. and The University of Kansas	10-K	001-33093	March 3, 2011	10.105
10.22	First Amendment to License Agreement, dated August 4, 2004, between CyDex, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.106
10.23†	Second Amendment to License Agreement, dated August 4, 2004, between CyDex, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.107
10.24†	Acknowledgement Agreement, dated February 22, 2008, between CyDex, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.111
10.25†	Exclusive License Agreement, dated June 4, 1996, between Pfizer, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.108
10.26†	Addendum to Nonexclusive License Agreement, dated December 11, 2001, between CyDex, Inc. and Pfizer, Inc.	10-K	001-33093	March 3, 2011	10.11
10.27†	Amendment to License Agreement, dated May 12, 2006, between CyDex, Inc. and Prism Pharmaceuticals, Inc.	10-K	001-33093	March 3, 2011	10.113
10.28†	Supply Agreement, dated March 5, 2007, between CyDex, Inc. and Prism Pharmaceuticals, Inc.	10-K	001-33093	March 3, 2011	10.114
10.29†	License and Supply Agreement, dated October 12, 2005, between CyDex Pharmaceuticals, Inc. and Proteolix, Inc.	10-K	000-28298	February 23, 2010	10.22
10.30†	Supply Agreement, dated June 13, 2011 by and between CyDex Pharmaceuticals, Inc. and Merck Sharp & Dohme Corporation	10-Q/A	001-33093	November 2, 2017	10.26
10.31†	License Agreement, by and between CyDex Pharmaceuticals, Inc. and Spectrum Pharmaceuticals, Inc., dated as of March 8, 2013	10-Q	001-33093	May 8, 2013	10.2
10.32†	Supply Agreement, by and between CyDex Pharmaceuticals, Inc. and Spectrum Pharmaceuticals, Inc., dated as of March 8, 2013	10-Q	001-33093	May 8, 2013	10.3
10.33†	Royalty Stream and Milestone Payments Purchase Agreement, dated April 29, 2013, between the Company and Selexis S.A.	10-Q	001-33093	August 1, 2013	10.2
10.34†	Master License Agreement dated May 21, 2014 among the Company, Metabasis Therapeutics, Inc. and Viking Therapeutics, Inc.	10-Q	001-33093	August 5, 2014	10.2
10.35	Letter Agreement, dated as of August 12, 2014, between Bank of America, N.A. and the Company regarding the Base Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.2
10.36	Letter Agreement, dated as of August 12, 2014, between Deutsche Bank AG, London Branch and the Company regarding the Base Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.4
10.37	Letter Agreement, dated as of August 14, 2014, between Bank of America, N.A. and the Company regarding the Additional Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.6
10.38	Letter Agreement, dated as of August 14, 2014, between Deutsche Bank AG, London Branch and the Company regarding the Additional Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.8
10.39†	First Amendment to Master License Agreement dated September 6, 2014 among the Company, Metabasis Therapeutics, Inc. and Viking Therapeutics, Inc.	10-Q	001-33093	October 31, 2014	10.9
10.40†	Second Amendment to Master License Agreement, dated April 8, 2015, among the Company, Metabasis Therapeutics, Inc. and Viking Therapeutics, Inc.	10-Q	001-33093	August 5, 2015	10.1
10.41†	Development Funding and Royalties Agreement, dated December 13, 2018, by and between Ligand Pharmaceuticals Incorporated and Palvella Therapeutics, Inc.	10-K	001-33093	February 28, 2019	10.48

10.42†	Sublicense Agreement between the Company, Pharmacopeia, Inc. and Retrophin LLC dated as of February 16, 2012, as amended through Amendment No. 5 to Sublicense Agreement, dated March 20, 2018.					X
10.43†	Lease, dated November 3, 2015, between the Company and 3911/3931 SVB, LLC	8-K	001-33093	November 10, 2015	10.1	
10.44†	Interest Purchase Agreement, dated May 3, 2016, between the Company and CorMatrix Cardiovascular, Inc.	8-K/A	001-33093	May 9, 2016	10.1	
10.45	Amended and Restated Interest Purchase Agreement, dated May 31, 2017, between the Company and CorMatrix Cardiovascular, Inc.	10-Q	001-033093	August 9, 2017	10.2	
10.46	License Agreement, dated March 5, 2018, between the Company and Roivant Sciences GmbH	10-Q	001-33093	May 9, 2018	10.2	
10.47	Letter Agreement, dated as of May 17, 2018, between Barclays Capital Inc. and the Company regarding the Base Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.1	
10.48	Letter Agreement, dated as of May 17, 2018, between Barclays Capital Inc. and the Company regarding the Base Warrant Transaction	8-K	001-00393	May 22, 2018	10.2	
10.49	Letter Agreement, dated as of May 17, 2018, between Deutsche Bank AG and the Company regarding the Base Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.3	
10.50	Letter Agreement, dated as of May 17, 2018, between Deutsche Bank AG and the Company regarding the Base Warrant Transaction	8-K	001-00393	May 22, 2018	10.4	
10.51	Letter Agreement, dated as of May 17, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Base Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.5	
10.52	Letter Agreement, dated as of May 17, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Base Warrant Transaction	8-K	001-00393	May 22, 2018	10.6	
10.53	Letter Agreement, dated as of May 18, 2018, between Barclays Capital Inc. and the Company regarding the Additional Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.7	
10.54	Letter Agreement, dated as of May 18, 2018, between Barclays Capital Inc. and the Company regarding the Additional Warrant Transaction	8-K	001-00393	May 22, 2018	10.8	
10.55	Letter Agreement, dated as of May 18, 2018, between Deutsche Bank AG and the Company regarding the Additional Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.9	
10.56	Letter Agreement, dated as of May 18, 2018, between Deutsche Bank AG and the Company regarding the Additional Warrant Transaction	8-K	001-00393	May 22, 2018	10.10	
10.57	Letter Agreement, dated as of May 18, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Additional Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.11	
10.58	Letter Agreement, dated as of May 18, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Additional Warrant Transaction	8-K	001-00393	May 22, 2018	10.12	
10.59†	Platform License Agreement, dated March 23, 2015, by and between Open Monoclonal Technology, Inc. and WuXi AppTec Biopharmaceuticals Co., Ltd.	10-Q	001-33093	August 8, 2018	10.13	

10.60†	Amendment Number 1 to Platform License Agreement, dated June 11, 2017, by and between Open Monoclonal Technology, Inc. and WuXi Biologics (Hong Kong) Limited (as successor-in-interest to WuXi AppTec Biopharmaceuticals Co., Ltd.)	10-Q	001-33093	August 8, 2018	10.14	
10.61†	Amendment Number 2 to Platform License Agreement, dated June 25, 2018, by and between Open Monoclonal Technology, Inc. and WuXi Biologics Ireland Limited (as successor-in-interest to WuXi Biologics (Hong Kong) Limited).	10-Q	001-33093	August 8, 2018	10.15	
10.62#	Form of Indemnification Agreement between the Company and each of its directors	10-K	001-33093	March 1, 2018	10.60	
10.63#	Form of Indemnification Agreement between the Company and each of its officers	10-K	001-33093	March 1, 2018	10.60	
10.64†	Addendum, dated May 22, 2019, by and among Ligand Pharmaceuticals Incorporated, CyDex Pharmaceuticals, Inc., and Acrotech Biopharma LLC (as successor-in-interest to Spectrum Pharmaceuticals, Inc.), to that certain License Agreement between Ligand Pharmaceuticals Incorporated and Spectrum Pharmaceuticals, Inc., dated March 8, 2013	10-Q	001-33093	August 8, 2019	10.1	
21.1	Subsidiaries of the Company					X
23.1	Consent of Independent Registered Public Accounting Firm					X
31.1	Certification by Principal Executive Officer, Pursuant to Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.2	Certification by Principal Financial Officer, Pursuant to Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
32.1	Certifications by Principal Executive Officer and Principal Financial Officer, Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
101	The following financial information from our Annual Report on Form 10-K for the fiscal year ended December 31, 2019, formatted in iXBRL (inline eXtensible Business Reporting Language): (i) Consolidated Balance Sheets, (ii) Consolidated Statements of Operations, (iii) Consolidated Statement of Comprehensive Income, (iv) Consolidated Statements of Stockholders' Equity, (v) Consolidated Statements of Cash Flows, and (vi) the Notes to Consolidated Financial Statements.					X
104	The cover page from the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2019, formatted in Inline XBRL and contained in Exhibit 101.					X

† Confidential treatment has been requested for portions of this exhibit. These portions have been omitted and submitted separately to the Securities and Exchange Commission.
# Indicates management contract or compensatory plan.

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, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

LIGAND PHARMACEUTICALS INCORPORATED

By: /S/ JOHN L. HIGGINS

John L. Higgins,
Chief Executive Officer

Date: February 27, 2020

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/ JOHN L. HIGGINS **John L. Higgins**	Chief Executive Officer and Director (Principal Executive Officer)	February 27, 2020
/s/ MATTHEW KORENBERG **Matthew Korenberg**	Executive Vice President, Finance and Chief Financial Officer (Principal Financial and Accounting Officer)	February 27, 2020
/s/ JOHN W. KOZARICH **John W. Kozarich**	Director and Chairman of the Board	February 27, 2020
/s/ JASON M. ARYEH **Jason M. Aryeh**	Director	February 27, 2020
/s/ SARAH BOYCE **Sarah Boyce**	Director	February 27, 2020
/s/ TODD C. DAVIS **Todd C. Davis**	Director	February 27, 2020
/s/ NANCY R. GRAY **Nancy R. Gray**	Director	February 27, 2020
/s/ JOHN L. LAMATTINA **John L. LaMattina**	Director	February 27, 2020
/s/ SUNIL PATEL **Sunil Patel**	Director	February 27, 2020
/s/ STEPHEN L. SABBA **Stephen L. Sabba**	Director	February 27, 2020

Exhibit 4.3

DESCRIPTION OF THE REGISTRANT'S SECURITIES REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

Ligand Pharmaceuticals Incorporated ("Ligand," "we," "our" and "us") has one class of securities registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended: our common stock.

Description of Common Stock

General

The following summary of the terms of our common stock does not purport to be complete and is subject to and qualified in its entirety by reference to our Amended and Restated Certificate of Incorporation, as amended (the "certificate of incorporation"), and the Amended and Restated Bylaws, as amended (the "bylaws"), which are filed as exhibits to our most recent Annual Report on Form 10-K and are incorporated by reference herein.

Under our certificate of incorporation, the total number of shares of all classes of stock that we have authority to issue is 65,000,000, consisting of 5,000,000 shares of preferred stock, par value $0.001 per share, and 60,000,000 shares of common stock, par value $0.001 per share.

Common Stock

Voting Rights

The holders of our common stock are entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders, including the election of directors, and do not have cumulative voting rights. Accordingly, the holders of a majority of the shares of common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they so choose.

Dividends

Subject to limitations under Delaware law and preferences that may be applicable to any then outstanding preferred stock, holders of common stock are entitled to receive ratably those dividends, if any, as may be declared by our board of directors out of legally available funds.

Liquidation

Upon our liquidation, dissolution or winding up, the holders of common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities of our company, subject to the prior rights of any preferred stock then outstanding.

Rights and Preferences

Holders of common stock have no preemptive or conversion rights or other subscription rights and there are no redemption or sinking funds provisions applicable to the common stock.

Fully Paid and Nonassessable

All outstanding shares of our common stock are fully paid and nonassessable and the shares of common stock offered hereby will be fully paid and nonassessable.

Anti-Takeover Effects of Provisions of Our Certificate of Incorporation, Our Bylaws and Delaware Law

Some provisions of Delaware law, our certificate of incorporation and our bylaws contain provisions that could make the following transactions more difficult: acquisition of us by means of a tender offer; acquisition of us by means of a proxy contest or otherwise; or removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions that might result in a premium over the market price of our shares.

These provisions, summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Undesignated Preferred Stock

The ability to authorize undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change control of us. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our company.

Requirements for Advance Notification of Stockholder Nominations and Proposals

Our bylaws establish advance notice procedures with respect to stockholder proposals and the nomination of candidates for election as directors, other than nominations made by or at the direction of the board of directors or a committee of the board of directors. These provisions could have the effect of delaying until the next stockholder meeting stockholder actions that are favored by the holders of a majority of our outstanding voting securities.

Elimination of Stockholder Action by Written Consent

Our certificate of incorporation eliminates the right of stockholders to act by written consent without a meeting.

Special Meetings

Our bylaws state that a special meeting of the stockholders may be called by our president and shall be called by our president or secretary upon written request from our board of directors or upon a written request from stockholders owning at least 10% of the entire capital stock of the company issued and outstanding and entitled to vote.

Delaware Anti-Takeover Statute

We are subject to Section 203 of the Delaware General Corporation Law. This statute regulating corporate takeovers prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for three years following the date that the stockholder became an interested stockholder, unless:

- prior to the date of the transaction, the Board approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder;

- the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the number of shares outstanding (a) shares owned by persons who are directors and also officers and (b) shares owned by employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or

- on or subsequent to the date of the transaction, the business combination is approved by the Board and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock which is not owned by the interested stockholder.

Section 203 defines a business combination to include:

- any merger or consolidation involving the corporation and the interested stockholder;

- any sale, transfer, pledge or other disposition involving the interested stockholder of 10% or more of the assets of the corporation;

- subject to exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

- any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or

- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.

In general, Section 203 defines an interested stockholder as an entity or person beneficially owning 15% or more of the outstanding voting stock of the corporation and any entity or person affiliated with or controlling or controlled by such entity or person.

Fair Market Value Provision

Our certificate of incorporation contains a fair market value provision that requires the approval of the holders of 66 2/3% of our outstanding voting stock as a condition to a merger or certain other business transactions with, or proposed by, any person that beneficially owns, directly or indirectly, 15% or more of our voting stock (an "Interested Stockholder"), except in cases where a majority of the Continuing Directors (as defined below) approve the transaction or certain minimum price criteria and other procedural requirements are met. A "Continuing Director" is (i) a director who was originally elected upon incorporation of Ligand, (ii) a director who is not an Interested Stockholder or affiliated with an Interested Stockholder, or (iii) a director whose nomination or election to our board of directors is recommended or approved by a majority of the Continuing Directors. The minimum price criteria are recommended or approved by a majority of the Continuing Directors. The minimum price criteria generally require that, in a transaction in which stockholders are to receive payments, holders of our common stock must receive, on the consummation date of the transaction, a value equal to the higher of (A) the highest price paid by the Interested Stockholder for common stock during the prior two years and (B) the highest closing sale price of common stock during the 30-day period before (1) the announcement of the transaction or (2) the date on which the Interested Stockholder became an Interested Stockholder, whichever is higher. In addition, such payment must be made in cash or in the type of consideration paid by the Interested Stockholder for the greatest portion of its shares. Our board of directors believes that this fair market value provision helps assure that all our stockholders will be treated similarly if certain kinds of business transactions are effected. However, this fair market value provision may make it more difficult to accomplish certain transactions that are opposed by the incumbent board of directors and that could be beneficial to stockholders.

Amendment of Charter Provisions

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock, would require approval by holders of at least 66 2/3% of our then outstanding common stock.

The provisions of Delaware law, our certificate of incorporation and our bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in our management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Amendment of Bylaws

The affirmative vote of the holders of at least the majority of the total voting power of all outstanding shares of our voting stock is required for stockholders to amend our bylaws. This provision makes it more difficult to circumvent the anti-takeover provisions of our bylaws. Our board of directors is authorized to make, amend, supplement or repeal our bylaws; provided that no amendment or supplement to the bylaws adopted by the board of directors may vary or conflict with any amendment or supplement duly adopted by the stockholders.

Listing

Our common stock is listed for trading on the Nasdaq Global Market under the symbol "LGND."

Transfer Agent and Registrar

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

Exhibit 10.9

LIGAND PHARMACEUTICALS INCORPORATED

DIRECTOR COMPENSATION AND STOCK OWNERSHIP POLICY

(Amended and Restated Effective March 28, 2019)

I. DIRECTOR COMPENSATION

Non-employee members of the board of directors (the "***Board***") of Ligand Pharmaceuticals Incorporated (the "***Company***") shall be eligible to receive cash and equity compensation effective as of March 28, 2019 (the "***Restatement Effective Date***"), as set forth in this Director Compensation Policy. The cash compensation and stock awards described in this Director Compensation Policy shall be paid or be made, as applicable, automatically and without further action of the Board, to each member of the Board who is not an employee of the Company or any parent or subsidiary of the Company (each, an "***Independent Director***") who may be eligible to receive such cash compensation or stock awards, unless such Independent Director declines the receipt of such cash compensation or stock awards by written notice to the Chairman of the Board. This Director Compensation Policy shall remain in effect until it is revised or rescinded by further action of the Board. The terms and conditions of this Director Compensation Policy shall supersede any prior cash or equity compensation arrangements between the Company and its directors.

1. Cash Compensation.

a. Annual Retainer. Each Independent Director shall be eligible to receive an annual retainer of $50,000 for service on the Board. In addition, an Independent Director serving as:

i. chairman of the Board shall be eligible to receive an additional annual retainer of $30,000 for such service;

ii. chairman of the Audit Committee shall be eligible to receive an additional annual retainer of $20,000 for such service;

iii. members (other than the chairman) of the Audit Committee shall be eligible to receive an additional annual retainer of $10,000 for such service;

iv. chairman of the Compensation Committee shall be eligible to receive an additional annual retainer of $15,000 for such service;

v. members (other than the chairman) of the Compensation Committee shall be eligible to receive an additional annual retainer of $7,500 for such service;

vi. chairman of the Nominating and Corporate Governance Committee shall be eligible to receive an additional annual retainer of $10,000 for such service; and

vii. members (other than the chairman) of the Nominating and Corporate Governance Committee shall be eligible to receive an additional annual retainer of $5,000 for such service.

b. Payment of Cash Compensation. Annual retainer fees shall be paid after each annual meeting of the Company's stockholders in advance for the upcoming year of service and shall be prorated for the period of the year served for Independent Directors who are elected or appointed to the Board

at a time other than the date of the annual meeting of the Company's stockholders; provided, however, that an Independent Director may elect in writing prior to the date of an annual meeting to receive all or a portion of his annual retainer fee in the form of such number of fully vested shares of the Company's common stock as is equal to (i) the amount of the annual retainer the Independent Director has elected to receive in the form of shares of the Company's common stock, divided by (ii) the closing price per share of the Company's common stock on the Nasdaq Global Market (or such other established stock exchange or national quotation system on which the stock is quoted) on the date of the annual meeting. Committee retainer fees shall also be paid annually after each annual meeting of the Company's stockholders in advance for the upcoming year of service and shall be prorated for any partial quarters served for Independent Directors who serve on a committee for a partial year.

2. Equity Compensation. The Independent Directors shall be granted the following stock awards. The stock awards described below shall be granted under and shall be subject to the terms and provisions of the Company's 2002 Stock Incentive Plan (the "***2002 Plan***") and shall be granted subject to the execution and delivery of award agreements, including attached exhibits, in substantially the same forms previously approved by the Board.

a. Initial Stock Awards. A person who is initially elected or appointed to the Board on or after the Restatement Effective Date, and who was or is an Independent Director at the time of such initial election or appointment, shall be eligible to receive the following stock awards on the date of such initial election or appointment (each, an "***Initial Stock Award***"):

i. that number of restricted stock units determined by dividing (A) $145,000, by (B) the average closing price per share of the Company's common stock on the Nasdaq Global Market (or such other established stock exchange or national quotation system on which the stock is quoted) for the 30-calendar day period prior to the date of grant; and

ii. that number of stock options having a value of $280,000, calculated on the grant date in accordance with the Black-Scholes option pricing model (utilizing the same assumptions that the Company utilizes in preparation of its financial statements).

b. Subsequent Stock Awards. A person who is an Independent Director as of the date of each annual meeting of the Company's stockholders and who is re-elected for another year of service as an Independent Director at such annual meeting automatically shall be eligible to receive the following stock awards on the date of each such annual meeting of the Company's stockholders on or after the Restatement Effective Date (each, a "***Subsequent Stock Award***"):

i. that number of restricted stock units determined by dividing (A) $95,000, by (B) the average closing price per share of the Company's common stock on the Nasdaq Global Market (or such other established stock exchange or national quotation system on which the stock is quoted) for the 30-calendar day period prior to the date of grant; and

ii. that number of stock options having a value of $190,000, calculated on the grant date in accordance with the Black-Scholes option pricing model (utilizing the same assumptions that the Company utilizes in preparation of its financial statements).

An Independent Director elected for the first time to the Board at an annual meeting of stockholders shall only receive an Initial Restricted Stock grant in connection with such election, and shall not receive a Subsequent Restricted Stock grant on the date of such meeting as well. The stock awards described in this clause shall be referred to as "***Subsequent Stock Awards***."

c. Termination of Employment of Employee Directors. Members of the Board who are employees of the Company or any parent or subsidiary of the Company who subsequently terminate their

employment with the Company and any parent or subsidiary of the Company and remain on the Board will not receive any Initial Stock Awards pursuant to clause 2(a) above, but to the extent that they are otherwise eligible, will be eligible to receive, after termination from employment with the Company and any parent or subsidiary of the Company, Subsequent Stock Awards as described in clause 2(b) above.

d. Vesting of Stock Awards Granted to Independent Directors

i. Initial Stock Awards granted hereunder shall vest in three (3) equal annual installments on each of the first three (3) anniversaries following the date of grant, subject to the Independent Director's continuing service on the Board through each such vesting date.

ii. Subsequent Stock Awards granted hereunder shall vest in full on the earlier of (A) the date of the annual meeting of the Company's stockholders next following the grant date (it being understood that the Subsequent Stock Awards shall vest on the date of such annual meeting whether or not the Independent Director is re-elected at such meeting, so long as the Independent Director serves through such meeting) and (B) on the first anniversary of the date of grant, subject to the Independent Director's continuing service on the Board through each such vesting date.

iii. Any stock awards granted hereunder shall vest in full in the event of a Change in Control or a Hostile Take-Over (each as defined in the 2002 Plan) to the extent the Independent Director is serving on the Board at the time of such transaction or in the event an Independent Director ceases to serve on the Board by reason of death or Permanent Disability as defined in the 2002 Plan.

iv. Any unvested stock awards will be forfeited to the Company in the event an Independent Director ceases to serve on the Board prior to the vesting of such awards.

e. Effect of Termination of Board Service on Stock Options. An Independent Director shall be able to exercise his or her stock options that were vested at the time of his or her cessation of Board service until the first to occur of (i) the third anniversary of the date of his or her cessation of Board service, or (ii) the original expiration date of the term of such stock options.

f. Term of Stock Options. Each stock option granted hereunder shall have a term of ten (10) years measured from the date of grant.

g. Exercise Price of Stock Options. The exercise price per share of any stock options granted hereunder shall be equal to one hundred percent (100%) of the Fair Market Value (as defined in the 2002 Plan) of the common stock on the date of grant.

II. DIRECTOR STOCK OWNERSHIP GUIDELINES

Independent Directors are expected to own and hold shares of the Company's common stock with a value equal to three times the annual cash retainer for service as an Independent Director (without regard to any retainers paid for committee service or service as chairman of the Board). The stock ownership level should be achieved by each Independent Director on or before April 30, 2014 or, if later, within three years after the Independent Director's first appointment to the Board.

Stock that counts toward satisfaction of these guidelines include: shares of common stock owned outright by the Independent Director and his or her immediate family members who share the same household, whether held individually or jointly; restricted stock where the restrictions have lapsed; shares acquired upon stock

option exercise; shares purchased in the open market; and shares held in trust for the benefit of the Independent Director or his or her family. Restricted stock units, which represent the right to receive shares, do not count towards satisfaction of these guidelines. Shares held in trust may be included. Due to the complexities of trust accounts, requests to include shares held in trust should be submitted to the Secretary of the Company and the Chairman of the Board will make the final decision as to whether to include those shares.

An Independent Director will be deemed to be in compliance with these guidelines if the Fair Market Value (as defined in the 2002 Plan) of the shares of the Company's common stock held by such Independent Director on any date prior to the deadline for his or her compliance equals or exceeds the required multiple of his or her annual cash retainer. After meeting the requirements set forth in these guidelines, any subsequent decreases in the market value of the Company's common stock shall not be considered, so long as the Independent Director continues to hold at least the same number of shares of the Company's common stock as he or she did when the guidelines were first met or exceeded by such Independent Director.

The guidelines may be waived for Independent Directors, at the discretion of the Board, if compliance would create hardship or prevent an Independent Director from complying with a court order, as in the case of a divorce settlement.

SUBLICENSE AGREEMENT

THIS SUBLICENSE AGREEMENT (the "Agreement") is made and entered into effective as of February 16, 2012 (the "Effective Date") by and between Ligand Pharmaceuticals Incorporated, a corporation organized under the laws of Delaware and having a place of business at 11085 North Torrey Pines Road, Suite 300, La Jolla, CA, 92037 and its wholly owned subsidiary, Pharmacopeia, Inc. (as successor in interest to Pharmacopeia Drug Discovery Inc.) ("PCOP"), a limited liability company organized under the laws of Delaware and having a place of business at 11085 North Torrey Pines Road, Suite 300, La Jolla, CA, 92037 (collectively, Ligand Pharmaceuticals Incorporated and PCOP shall be known as "Ligand") and Retrophin, LLC, a limited liability company organized under the laws of Delaware and having a place of business at 330 Madison Avenue, 6th Floor, New York, NY, 10017 ("Retrophin"). Ligand and Retrophin are each referred to herein by name or individually as a "Party" or collectively as the "Parties."

RECITALS

WHEREAS, Ligand has in-licensed certain patent rights and know-how rights with respect to the Licensed Compounds (as defined below) and has the right to sublicense the same;

WHEREAS, Retrophin desires to obtain from Ligand sublicenses relating to the Licensed Compounds and Ligand desires to grant such sublicenses to Retrophin, all on the terms and conditions set forth in this Agreement;

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants and agreements set forth below, the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

Article 1.

DEFINITIONS

The terms in this Agreement with initial letters capitalized shall have the meaning set forth below or, if not listed below, the meaning designated in places throughout this Agreement.

1.1 "AAA" has the meaning set forth in Section 14.3.1.

1.2 "Act" means the United States Food, Drug and Cosmetic Act, as amended.

1.3 "Active Compound" has the meaning set forth in Appendix 2 hereto.

1.4 "Affiliate" of a Person means any other Person which (directly or indirectly) is controlled by, controls or is under common control with such Person. For the purposes of this definition, the term "control" (including, with correlative meanings, the terms "controlled by" and "under common control with") as used with respect to a Person means (i) in the case of a corporate entity, direct or indirect ownership of voting securities entitled to cast at least **[***]** of the votes in the election of directors or (ii) in the case of a non-

corporate entity, direct or indirect ownership of at least **[***]** of the voting securities with the power to direct the management and policies of such entity.

1.5 "Agreement" has the meaning set forth in the initial paragraph herein and includes all Appendices attached hereto, as the same may be amended or supplemented from time to time.

1.6 "Approval" means, with respect to any Licensed Product in any regulatory jurisdiction, approval from the applicable Regulatory Authority sufficient for the manufacture, distribution, use and sale of the Licensed Product in such jurisdiction in accordance with applicable Laws.

1.7 "BMS" means Bristol-Myers Squibb Company, a Delaware corporation headquartered at 345 Park Avenue, New York, New York 10154.

1.8 "BMS Know-How" means **[***]**. BMS Know-How shall not include **[***]**.

1.9 "Business Day" or "business day" means a day other than Saturday, Sunday or any day on which commercial banks located in New York, New York are authorized or obligated by applicable Laws to close.

1.10 **[***]**.

1.11 **[***]**.

1.12 "Combination Product" means **[***]**.

1.13 "Commercialization" or "Commercialize" means activities directed to commercially manufacturing, obtaining pricing and reimbursement approvals, carrying out Phase 4 Trials for, marketing, promoting, distributing, importing or selling a pharmaceutical product.

1.14 "Commercially Reasonable Efforts" means, with respect to Licensed Compounds and Licensed Products, the carrying out of Development or Commercialization activities in a **[***]**. Without limiting the foregoing, Commercially Reasonable Efforts requires that a Party: (i) **[***]** (ii) **[***]** (iii) **[***]** (iv) **[***]** (v) **[***]**.

1.15 "Competitive Compound" means any **[***]** that is **[***]** unless Ligand has**[***]**. Ligand shall not **[***]**.

1.16 "Confidential Information" means all trade secrets, processes, formulae, data, know-how, improvements, inventions, chemical or biological materials, assays, techniques, marketing plans, strategies, customer lists, or other information that has been created, discovered, or developed by a Party, or has otherwise become known to a Party, or to which rights have been assigned to a Party, as well as any other information, agreements and materials that are deemed confidential or proprietary to or by a Party (including all information and materials of a Party's customers and any other Third Party and their consultants), in each case that are disclosed by such Party to the other Party, regardless of whether any of the foregoing are marked "confidential" or "proprietary" or communicated to the other by the disclosing Party in oral, written, graphic, or electronic form.

1.17 "Controlled" or "Controls", when used in reference to intellectual property, means the legal authority or right of a Party hereto (or any of its Affiliates) to grant a license or sublicense of intellectual property rights to another Party, or to otherwise

disclose proprietary or trade secret information to such other Party, without breaching the terms of any agreement with a Third Party, or misappropriating the proprietary or trade secret information of a Third Party.

1.18 "Core Patent Rights" means the patents and patent applications that are listed in Appendix 1 hereto and (a) **[***]** that **[***]** listed in Appendix 1 hereto **[***]** and **[***]** (but in each case, only with respect to **[***]** listed in Appendix 1 hereto), (b) all **[***]** foregoing**[***]**, together with all **[***]** thereof (but in each case, only with respect to **[***]** in Appendix 1 hereto).

1.19 "Cover," "Covered" or "Covering" means, with respect to patent rights, that the making, using, importation, offer for sale or sale of an invention claimed in such patent rights or the conducting of an activity that, in the absence of a license under such patent rights, would infringe at least one Valid Claim of such patent rights whether present in an issued patent or in a patent application if it issued as a patent containing such claim.

1.20 "Development" means non-clinical and clinical drug development activities reasonably related to the development and submission of information to a Regulatory Authority, including toxicology, pharmacology and other discovery and pre-clinical efforts, test method development and stability testing, manufacturing process development, formulation development, delivery system development, quality assurance and quality control development, statistical analysis, clinical studies (including, pre- and post-approval studies and specifically excluding regulatory activities directed to obtaining pricing and reimbursement approvals). When used as a verb, "Develop" means to engage in Development.

1.21 "Development Plan" means, with respect to any Licensed Product, a comprehensive, multi-year plan specifying the anticipated timing and technical details of Development activities for such Licensed Product, including the indications to be targeted, line of therapy, timelines for completing key activities, phasing of development, primary endpoints, criteria for continuing activities, study size, comparator drugs, combination drugs, timelines for data preparation and filing of regulatory submissions, toxicology and pharmacology studies and manufacturing process development and scale up. An outline of the initial Development Plan as of the Effective Date is attached hereto as Appendix 3.

1.22 "Dollar" or "$" means the lawful currency of the United States.

1.23 "Effective Date" has the meaning set forth in the initial paragraph of this Agreement.

1.24 "EMEA" means the European Agency for the Evaluation of Medicinal Products, or any successor agency thereto.

1.25 "Excluded Claim" means a Dispute that concerns (a) the validity or infringement of a patent, trademark or copyright or (b) any antitrust, anti-monopoly or competition law or regulation, whether or not statutory.

1.26 "Executive" means for Ligand, the Chief Executive Officer of Ligand (or such individual's designee) and for Retrophin, the Chief Executive Officer of Retrophin (or such individual's designee). If either position is vacant or either position does not exist, then the person having the most nearly equivalent position (or such individual's designee) shall be deemed to be the Executive of the relevant Party.

1.27 "Exit Transaction" means: (i) **[***]**

1.28 "FDA" means the U.S. Food and Drug Administration, or any successor agency thereto.

1.29 "Field" means the diagnosis, prevention, treatment or control of any human or animal disease, disorder or condition.

1.30 "First Commercial Sale" means, with respect to any Licensed Product, the first sale for use or consumption by the general public of such Licensed Product in any country in the Territory after Approval of such Licensed Product has been granted, or such marketing and sale is otherwise permitted, by the Regulatory Authority of such country.

1.31 "GAAP" means generally accepted accounting principles in the United States.

1.32 "IND" means an Investigational New Drug Application, as defined in the Act, filed with the FDA or its foreign counterparts.

1.33 "Indemnification Claim" has the meaning set forth in Section 12.3.

1.34 "Indemnitee" has the meaning set forth in Section 12.3.

1.35 "Indemnitor" has the meaning set forth in Section 12.3.

1.36 "JNDA" means a New Drug Application filed with the Koseisho required for marketing approval for the applicable Licensed Product in Japan.

1.37 "JNDA Approval" means the approval of a JNDA by the Koseisho for the applicable Licensed Product in Japan.

1.38 "JNDA Filing" means the submission to the Koseisho of a JNDA for the applicable Licensed Product in Japan.

1.39 "Know-How" means **[***]**.

1.40 "Koseisho" means the Japanese Ministry of Health and Welfare, or any successor agency thereto.

1.41 "Laws" means all laws, statutes, rules, regulations, ordinances and other pronouncements having the effect of law of any federal, national, multinational, state, provincial, county, city or other political subdivision, agency or other body, domestic or foreign.

1.42 "License" means any agreement transferring rights with respect to any Licensed Compound or any Licensed Product by Retrophin (or an Affiliate of Retrophin) to any Third Party licensee, including any license, sublicense, co-development, co-promotion, distribution, joint venture, development and commercialization collaboration or similar transaction involving a transfer of rights with respect to a Licensed Compound or Licensed Product. "License" shall also include any further transfer of such rights by a Third Party licensee to any other Third Party. "License" also refers to the corresponding arrangement for the grant by Retrophin of rights back to BMS and Ligand with respect to one or more Licensed Compound(s) and Licensed Product(s) pursuant to Article 3.

1.43 "Licensed Compounds" means:

(a) the **[***]**;

(b) any **[***]**;

(c) any **[***]**; and

(d) any **[***]**.

1.44 "Licensed Product" means any pharmaceutical product containing a Licensed Compound (alone or with other active ingredients), in all forms, presentations, formulations and dosage forms.

1.45 "Listed Compounds" means those compounds identified in Appendix 4.

1.46 "Losses and Claims" has the meaning set forth in Section 12.1.

1.47 "MAA Approval" means approval by the EMEA of a marketing authorization application ("MAA") filed with the EMEA for the applicable Licensed Product under the centralized European procedure. If the centralized EMEA filing procedure is not used, MAA Approval shall be achieved upon the first Approval for the applicable Licensed Product in any two of the following countries: France, Germany, Italy, Spain or the United Kingdom.

1.48 "MAA Filing" means the submission to the EMEA of a MAA for the applicable Licensed Product under the centralized European procedure. If the centralized EMEA filing procedure is not used, MAA Filing shall be achieved upon the first filing of a marketing authorization application for the applicable Licensed Product in any two of the following countries: France, Germany, Italy, Spain or the United Kingdom.

1.49 "Major Market Countries" means the **[***]**. "Major Market Country" **[***]**.

1.50 "NDA" means a New Drug Application filed with the FDA required for marketing approval for the applicable Licensed Product in the U.S.

1.51 "NDA Approval" means the approval of a NDA by the FDA for the applicable Licensed Product in the U.S.

1.52 "NDA Filing" means the submission to the FDA of a NDA for the applicable Licensed Product.

1.53 "Net Sales" means, with respect to any **[***]**:

(a) **[***]**; *provided, however*, that where any such **[***]**;

(b) **[***]**;

(c) **[***]**; and

(d) **[***]**.

Net Sales shall be determined **[***]**. In the case of any Combination Product sold in the Territory, Net Sales for such Combination Product shall be calculated by **[***]**.

Net Sales shall not include any **[***]**.

1.54 "Orphan Licensed Product" means a Licensed Product that receives orphan drug designation from the FDA pursuant to 21 C.F.R. Part 316, or from a Regulatory Authority pursuant to a comparable rule or regulation in a foreign jurisdiction, including the orphan indications set forth in the Development Plan.

1.55 "Other Patent Rights" means (i) **[***]** (a) **[***]** or (b) **[***]** and (ii) **[***]**.

1.56 "Patent Rights" means the Core Patent Rights and the Other Patent Rights.

1.57 "Person" means any individual, firm, corporation, partnership, limited liability company, trust, business trust, joint venture company, governmental authority, association or other entity.

1.58 "Phase 2 Trial" means a human clinical trial of a Licensed Product, the principal purpose of which is a determination of safety and efficacy in the target patient population, as described in 21 C.F.R. 312.21(b), or a similar clinical study prescribed by the Regulatory Authorities in a foreign country. For purposes of this Agreement, "initiation of a Phase 2 Trial" for a Licensed Product means the first dosing of such Licensed Product in a human patient in a Phase 2 Trial.

1.59 "Phase 3 Trial" means a human clinical trial of a Licensed Product on a sufficient number of subjects that is designed to establish that a pharmaceutical product is safe and efficacious for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such pharmaceutical product in the dosage range to be prescribed, which trial is intended to support Approval of a Licensed Product, as described in 21 C.F.R. 312.21(c), or a similar clinical study prescribed by the Regulatory Authorities in a foreign country. For clarity, any human clinical trial may qualify as a Phase 3 Trial if it supports Approval of a Licensed Product without the need to conduct a Phase 3 Trial. For purposes of this Agreement, "initiation of a Phase 3 Trial" for a Licensed Product means the first dosing of such Licensed Product in a human patient in a Phase 3 Trial.

1.60 "Phase 4 Trial" means a human clinical trial for a Licensed Product commenced after receipt of Approval in the country for which such trial is being conducted and that is conducted within the parameters of the Approval for the Licensed Product. Phase 4 Trials may include epidemiological studies, modeling and pharmacoeconomic studies, investigator sponsored clinical trials of the Licensed Product and post-marketing surveillance studies.

1.61 "Proprietary Compound of BMS or Ligand" means any compound or other agent being developed or sold, (a) as of the March 27, 2006 or at any time thereafter, by BMS or its Affiliates, or their contractors or collaborators, or (b) as of the Effective Date or any time thereafter, by Ligand or its Affiliates, or their contractors or collaborators.

1.62 "Regulatory Authority" means any national or supranational governmental authority, including the FDA, EMEA or Koseisho (i.e., the Japanese Ministry of Health and Welfare, or any successor agency thereto), that has responsibility in countries in the Territory over the Development and/or Commercialization of Licensed Compounds and Licensed Products.

1.63 "Sublicensee" means any Third Party to whom rights are transferred with respect to any Licensed Compound or Licensed Product, including through any license, sublicense, co-development, co-discovery, co-promotion, distribution, joint venture,

Development and Commercialization collaboration or similar transaction between a Party (or an Affiliate of a Party) and a Third Party. "Sublicensee" shall also include any Third Party to whom such rights are transferred through further sublicense by a Sublicensee. "Sublicensee" shall include any Third Party that is a party to a License agreement.

1.64 "Territory" means any country in the world.

1.65 "Third Party" means any Person other than Retrophin, Ligand and their respective Affiliates.

1.66 "Title 11" has the meaning set forth in Section 13.7.

1.67 "United States" or "U.S." means the United States of America and its territories and possessions (including Puerto Rico).

1.68 **[***]**.

1.69 "Valid Claim" means a claim of (i) an issued and unexpired patent or a supplementary protection certificate, which claim has not been held invalid or unenforceable by a court or other government agency of competent jurisdiction from which no appeal can be or has been taken and has not been held or admitted to be invalid or unenforceable through re-examination or disclaimer, opposition procedure, nullity suit or otherwise or (ii) a pending patent application; *provided*, *however*, that if a claim of a pending patent application shall not have issued within **[***]** after the earliest filing date from which such claim takes priority, such claim shall not constitute a Valid Claim for the purposes of this Agreement unless and until a patent issues with such claim.

ARTICLE 2.

LICENSE GRANTS

2.1 Patent Rights and Know-How.

2.1.1 Core Patent Rights and Know-How. Subject to the terms and conditions set forth in this Agreement (including the reservation of rights in Section 2.5), Ligand hereby grants to Retrophin a non-transferable (except in accordance with Section 15.4), exclusive sublicense, with the right to further sublicense in accordance with Section 2.2, under the Core Patent Rights and Know-How solely to the extent reasonably necessary to, make, use (including in activities directed at the research and Development of Licensed Compounds), have made, sell, have sold, offer to sell, export, import and otherwise exploit or Commercialize Licensed Compounds and Licensed Products in the Field in the Territory.

2.1.2 Other Patent Rights. Subject to the terms and conditions set forth in this Agreement (including the reservation of rights in Section 2.5), Ligand hereby grants to Retrophin a non-transferable (except in accordance with Section 15.4), non-exclusive sublicense, with the right to further sublicense in accordance with Section 2.2, under the Other Patent Rights solely to the extent reasonably necessary or useful to make, use (including in activities directed at the research and Development of Licensed Compounds), have made, sell, offer to sell, export and import and otherwise exploit or Commercialize Licensed Compounds and Licensed Products in the Field in the Territory, *provided, however,* that no rights are granted under this Section 2.1.2 (or otherwise under this Agreement) with respect to any Proprietary Compound of BMS or Ligand. For clarification, no rights are granted under this Section 2.1.2 (or otherwise under this

Agreement) to co-formulate or use in combination a Licensed Compound with any Proprietary Compound of BMS or Ligand. The rights granted by Ligand to Retrophin under this Section 2.1.2 include the right to make, have made, use (including in activities directed at the research and Development of Licensed Compounds), export and import intermediates and starting materials reasonably necessary for the manufacture of Licensed Compounds, and to practice methods reasonably necessary for the manufacture of Licensed Compounds, and to practice methods reasonably necessary for manufacturing such intermediates and starting materials, but only for the purposes of manufacturing, using, importing or exporting Licensed Compounds in the Field in the Territory. For clarification, no rights are granted to sell or offer to sell any such intermediates or starting materials, or use such intermediates or starting materials for any purpose other than for the purposes of manufacturing Licensed Compounds.

2.2 Sublicenses.

2.2.1 Retrophin shall have the right to grant sublicenses with respect to the rights licensed to Retrophin under Sections 2.1.1 and 2.1.2 to any Affiliate of Retrophin for so long as such Affiliate remains an Affiliate of Retrophin; *provided, however,* that (i) such Affiliate shall agree in writing to be bound by and subject to the terms and conditions of this Agreement in the same manner and to the same extent as Retrophin and (ii) Retrophin shall remain responsible for the performance of this Agreement and shall cause such Affiliate to comply with the terms and conditions of this Agreement. In addition, Retrophin shall have the right to grant sublicenses with respect to the rights licensed to Retrophin under Sections 2.1.1 and 2.1.2 to Third Parties.

2.2.2 Retrophin shall have the right to enter into a License agreement with a Third Party; *provided, however,* to the extent any such License agreement grants rights with respect to any Licensed Compound:

(i) such License agreement shall be consistent with the terms and conditions of this Agreement, and shall not limit (A) Retrophin's ability to perform its obligations under this Agreement, (B) Ligand's rights under this Agreement, (C) **[***]** or (D) **[***]**.

(ii) in such License agreement, the Sublicensee shall agree in writing to be bound to Retrophin by terms and conditions that are substantially similar to, or less favorable to the Sublicensee than, or otherwise allow Retrophin to fully perform the corresponding terms and conditions of this Agreement;

(iii) such License agreement shall comply with Section 8.10.2 hereof regarding minimum royalty payments;

(iv) promptly after the execution of such License agreement, Retrophin shall provide a copy of such License agreement to Ligand, with financial and other confidential or proprietary commercial terms redacted consistent with the public filing of such license agreement with the Securities and Exchange Commission ("SEC"), or, if not filed with the SEC, then with financial and other confidential or proprietary commercial terms redacted (to the extent that such other commercial terms are not reasonably necessary for Ligand to determine Retrophin's compliance with this Agreement). **[***]**;

(v) Retrophin shall remain responsible for the performance of this Agreement (including its obligations under Sections 5.1.1 and 6.1), the payment of all

payments due, making reports and keeping books and records and shall use commercially reasonable efforts to monitor such Sublicensee's compliance with the terms of such License;

(vi) any sublicense rights granted by Retrophin in a License (to the extent such sublicensed rights are granted to Retrophin in this Agreement) shall terminate on a country-by-country and Licensed Product-by-Licensed Product basis effective upon (i) the termination under Section 13.2 of the license from Ligand to Retrophin with respect to such sublicensed rights or (ii) the termination under Section 13.2 of the license from BMS to Ligand with respect to such sublicensed rights; *provided, however,* that such sublicensed rights shall not terminate if, as of the effective date of such termination by Ligand under Section 13.2 of this Agreement or BMS under Section 13.2 of the Upstream License Agreement, the Sublicensee is not in material breach of its obligations to Retrophin under its License agreement, and within **[***]** days of such termination the Sublicensee agrees in writing to be bound directly to BMS or Ligand, as the case may be, under a license agreement substantially similar to this Agreement **[***]**, as the case may be, with respect to the rights sublicensed hereunder, substituting such Sublicensee for Retrophin or Ligand, as the case may be; and

(vii) such Sublicensees shall have the right to grant further sublicenses with respect to the Development or Commercialization of Licensed Products, provided that such further sublicenses shall be in accordance with and subject to all of the terms and conditions of this Section 2.2.

For purposes of clarification, the preceding provisions of this Section 2.2.2 shall not apply to Licensed Compounds with respect to which Retrophin **[***]** Ligand a License.

2.2.3 In accordance with the foregoing, unless Ligand agrees otherwise in writing, any License shall **[***]**.

2.2.4 It shall be a **[***]**.

2.3 No Trademark License. No right or license, express or implied, is granted to Retrophin to use any trademark, trade name, trade dress or service mark owned or Controlled by BMS, Ligand or any of their respective Affiliates. Retrophin, at its sole cost and expense, shall be responsible for the selection, registration and maintenance of all trademarks which it employs in connection with its activities conducted pursuant to this Agreement, if any, and shall own and control such trademarks.

2.4 No Implied Licenses. No license or other right is or shall be created or granted hereunder by implication, estoppel or otherwise. All such licenses and rights are or shall be granted only as expressly provided in this Agreement.

2.5 Retained Rights.

2.5.1 Retrophin understands and agrees that BMS shall retain the rights specified in Section 2.5 of the Upstream License Agreement.

2.5.2 Subject to the Upstream License Agreement, all rights not expressly granted under Section 2.1 are reserved by Ligand and may be used by Ligand for any purpose. Ligand expressly reserves and retains the right (i) to make, have made and use Licensed Compounds for any internal research purposes (including but not limited to for

purposes of screening in support of Ligand's internal research programs), (ii) to support the filing and prosecution of patent applications, and (iii) to make, have made and use any Licensed Compound solely for use as an intermediate or starting material in the manufacture of any compound which is not a Licensed Compound.

2.5.3 Subject to the exclusive rights granted to Retrophin under this Article 2 and subject to the restrictions on use of Retrophin's Confidential Information under Article 11, **[***]**. For purposes of clarity, nothing in the foregoing shall be construed to reserve to Ligand the right to engage in the discovery, Development and/or Commercialization of Active Compounds Covered by the Core Patent Rights exclusively licensed to Retrophin hereunder.

2.6 Upstream License Agreement. Notwithstanding anything to the contrary in this Agreement, Retrophin understands and agrees (i) that this Agreement is subordinate to the Upstream License Agreement and the sublicense granted to Retrophin under this Agreement is limited in scope to the rights granted to Ligand in the Upstream License Agreement; (ii) this Agreement may be terminated if the Upstream License Agreement is terminated (iii) it will comply with all provisions of the Upstream License Agreement relevant to its activities as a Sublicensee (as defined in the Upstream License Agreement); (iv) BMS' exercise of its rights under the Upstream License Agreement shall not constitute a breach hereunder; (v) it will not take any action that would result in a breach of the Upstream License Agreement; and (vi) it will cooperate with and assist Ligand to meet its obligations under the Upstream License Agreement. Retrophin acknowledges that it has been provided with a copy of the Upstream License Agreement.

ARTICLE 3.

LIGAND RIGHT OF FIRST NEGOTIATION

3.1 BMS Right of First Negotiation. In the event that Retrophin desires to enter into a License arrangement with respect to any Licensed Compound ("Business Opportunity"), BMS shall be granted the Right of First Negotiation set forth in Article 3 of the Upstream License Agreement. Retrophin shall comply with the terms set forth in Sections 3.1.1 and 3.1.3-3.1.6 of the Upstream License Agreement. For the purposes of this Section 3.1, "Pharmacopeia" shall be replaced with "Retrophin" in Sections 3.1.1 and 3,1.3-3.1.6 of the Upstream License Agreement.

3.2 Ligand Right of Second Negotiation.

3.2.1 In the event that Retrophin desires to enter into a Business Opportunity, before entering into negotiations with any Third Party and after following the procedure set forth in Section 3.1 above, with respect to such License, Retrophin shall notify Ligand and provide Ligand with information necessary or useful to Ligand to evaluate the proposed License arrangement ("Evaluation Information"). The Parties shall negotiate in good faith the terms pursuant to which Ligand may obtain such Business Opportunity for a period of **[***]** days following the date of such notice (such period referred to as the "Ligand Negotiation Period").

3.2.2 Unless otherwise agreed between the Parties, **[***]**.

3.2.3 Any License agreement entered into by Retrophin with a Third Party shall be consistent with the terms and conditions of this Agreement and shall fully enable Retrophin to fully perform all of its obligations under the Agreement which will continue

in effect. As set forth in Section 2.2, any Sublicensee shall be bound by the terms and conditions of this Agreement in the same manner as Retrophin.

ARTICLE 4.

TRANSFER OF KNOW-HOW

4.1 Documentation. Prior to the Effective Date, Ligand has provided to Retrophin one (1) electronic or paper copy of all documents, data or other information Controlled by Ligand as of the Effective Date to the extent that such documents, data and information are (i) reasonably necessary or useful for the manufacture, Development or Commercialization of the Listed Compounds (including SAR information) and subject to the Know-How license under Section 2.1 and (ii) are reasonably available to Ligand without undue searching; *provided however,* that subject to the last sentence of this Section 4.1, the foregoing shall in no event require Ligand to provide copies of manufacturing run records or laboratory notebook records; *further provided* that if Retrophin determines it needs additional documents, data or information for the manufacture, Development or Commercialization of the Licensed Compounds (including SAR information), Ligand shall use commercially reasonable efforts (at Retrophin's cost and expense) to determine whether it has such additional information and if Ligand has such information, it shall provide such information to Retrophin at Retrophin's cost and expense. Such documentation shall be deemed to be the Confidential Information of Ligand and shall not be used by Retrophin for any purpose other than Development, manufacture or Commercialization of Licensed Compounds and Licensed Products in accordance with this Agreement. Retrophin acknowledges that it has received from Ligand such documents, data and information prior to the Effective Date through access to the electronic data room established by Ligand for the Listed Compound and that Ligand has allowed Retrophin to print such documents. Ligand shall have no obligation to reformat or otherwise alter or modify any such materials, or to create materials in electronic form, in order to provide them to Retrophin; provided, that such information is readable by Retrophin in its current form. Any and all such materials delivered to Retrophin pursuant to this Section 4.1 are and shall remain, as between the Parties, the sole property of Ligand. Notwithstanding the foregoing, if at any time during the term of this Agreement Retrophin identifies particular documents, data or information (including laboratory notebook records) that are within the Know-How, but were not previously delivered to Retrophin, and that are reasonably necessary or useful for the continued manufacture, Development or Commercialization of a Licensed Compound or Licensed Product (including materials requested in connection with an audit or other inquiry by a Regulatory Authority), or are reasonably necessary or useful to support the filing and/or prosecution of patent rights Covering the Licensed Compounds or Licensed Products, Ligand shall promptly provide such material to Retrophin upon request to the extent that such items are in Ligand's possession and are available without undue searching.

4.2 Materials. Ligand shall have no obligation to provide Retrophin with samples of any compounds or other materials (other than the information provided under Section 4.1) under this Agreement, *provided* that upon written request by Retrophin, Ligand will authorize in writing the transfer by **[***]** to Retrophin of all existing clinical supplies of Licensed Product and all existing supplies of the active pharmaceutical ingredient of Licensed Product (including other materials that may be provided by or for Ligand to Retrophin pursuant to this Agreement, the "Transferred Materials"). Retrophin shall be responsible for any and all fees charged by **[***]** in connection with the transfer of the Transferred Materials to Retrophin. Any Transferred Materials are provided "AS IS". Retrophin shall be fully responsible for its and its Affiliates', Sublicensees' and

contractors' use, storage, handling and disposition of the Transferred Materials. Under no circumstances shall Ligand be liable or responsible for Retrophin's or its Affiliates', Sublicensees' and contractors' use, storage, handling or disposition of the Transferred Materials, and Retrophin assumes sole responsibility for any claims, liabilities, damages and losses that might arise as a result of Retrophin's and its Affiliates', Sublicensees' and contractors' use, storage, handling or disposition of any Transferred Material. Retrophin shall indemnify, defend and hold harmless Ligand and its Affiliates, and their respective officers, directors, employees, agents, licensors, and their respective successors, heirs and assigns and representatives, from and against any and all damages, liabilities, losses, costs and expenses (including, without limitation, reasonable legal expenses, costs of litigation and reasonable attorney's fees) arising in connection with any claims, suits, proceedings, whether for money damages or equitable relief, of any kind, arising out of or relating, directly or indirectly, to Retrophin's, or any of its Affiliates', Sublicensees' or contractors' use, storage, handling or disposition of any Transferred Material. Transferred Materials may only be provided to Retrophin, its Affiliates, Sublicensees and contractors. The Transferred Materials shall be used by Retrophin solely for purposes of supporting the Development of the Licensed Compounds and Licensed Products.

ARTICLE 5.

DEVELOPMENT

5.1 Development and Development Plan.

5.1.1 Commercially Reasonable Efforts. Retrophin (or its Sublicensees, as applicable) shall use sustained Commercially Reasonable Efforts to Develop at least one Licensed Compound and Licensed Product, including using Commercially Reasonable Efforts to expeditiously carry out the clinical development for the Licensed Compounds and Licensed Products (including expeditiously pursuing regulatory filings and Approvals and marketing authorizations for at least one Licensed Compound and Licensed Product) in accordance with the Development Plan.

5.1.2 Development Plan. The initial Development Plan is attached hereto as Appendix 3 to the Agreement.

5.2 Development Reports. Retrophin will provide Ligand with (a) semi-annual written development reports within **[***]** days following June and December of each **[***]** and (b) quarterly telephonic development reports within **[***]** days following March and September of each **[***]**, in each case presenting a summary of the Development activities accomplished by Retrophin during the applicable period, including as applicable updates to the Development Plan, and significant results, information and data generated with respect to Licensed Compounds and Licensed Products. Upon reasonable request by Ligand, Retrophin shall also meet in-person with Ligand to review Retrophin's Development activities for the Licensed Compounds and Licensed Products. In addition, prior to Retrophin entering into a License agreement with a Third Party, upon reasonable request by Ligand, but no more than once per **[***]**, Retrophin shall present to Ligand, at Retrophin's facilities, summaries of (and, at the request of Ligand, with copies of) clinical protocols, investigator brochures, regulatory submissions and correspondence from regulatory agencies with respect to Licensed Compound and Licensed Product that have been prepared or received by Retrophin as of the date of such request by Ligand.

5.3 Records. Retrophin shall maintain complete and accurate records of all work conducted in furtherance of the Development and Commercialization of the Licensed Compounds and Licensed Products and all material results, data and developments made in

conducting such activities. Such records shall be maintained sufficient detail and in good scientific manner appropriate for patent and regulatory purposes. If Ligand believes in good faith that Retrophin may not be complying with its obligations under this Section 5.3, Ligand shall provide written notice thereof to Retrophin identifying the basis for Ligand's belief, and Retrophin shall allow an independent Third Party that has expertise in reviewing the books and records and financial information, obligations and agreements of pre-clinical and clinical stage bio-technology companies, as to which Retrophin has no reasonable objection, to review such records on behalf of Ligand to verify that Retrophin is complying with this Section 5.3. Such review shall be conducted no more frequently than once per any twelve (12) month period, at Ligand's cost and upon reasonable advance notice at mutually agreed upon times during normal business hours; *provided, however,* if the independent Third Party determines that Retrophin is not in compliance with this Section 5.3 and Retrophin would owe Ligand at least 10% more in royalties or other payments, Retrophin shall reimburse Ligand for all costs and expenses related to the independent Third Party's review.

5.4 Development Responsibilities and Costs. Retrophin shall have sole responsibility for, and shall bear the cost of conducting, all Development with respect to the Licensed Compounds and Licensed Products.

5.5 Regulatory Responsibilities and Costs. Retrophin **[***]**. Retrophin shall be responsible for meeting the requirements of all pre-approval inspections required by any Regulatory Authorities. Except as set forth in Section 13.4, Retrophin or its Affiliate or Sublicensee shall own all INDs, NDAs, Approvals and submissions in connection therewith and all Approvals shall be obtained by and in the name of Retrophin or its Affiliate or Sublicensee.

5.6 Subcontracting. Subject to and without limiting Section 2.2, Retrophin may perform any activities in support of its Development or Commercialization of Licensed Compounds and Licensed Products through subcontracting to a Third Party contractor or contract service organization; *provided, however*: (a) Retrophin shall enter into an appropriate written agreement with any such Third Party subcontractor such that the subcontractor shall be bound by all applicable provisions of this Agreement to the same extent as Retrophin and such that Ligand's rights under this Agreement and BMS' rights under the Upstream License Agreement are not adversely affected; (b) any such Third Party subcontractor to whom Retrophin discloses Confidential Information of Ligand shall enter into an appropriate written agreement obligating such Third Party to be bound by obligations of confidentiality and restrictions on use of such Confidential Information that are no less restrictive than the obligations in this Agreement; (c) Retrophin will obligate such Third Party to agree in writing to assign or license (with the right to grant sublicenses) to Retrophin any inventions (and any patent rights covering such inventions) made by such Third Party in performing such services for Retrophin; and (d) Retrophin shall at all times be responsible for the performance of such subcontractor.

ARTICLE 6.

COMMERCIALIZATION

6.1 Retrophin Obligations. Retrophin (or its Sublicensees, as applicable) shall use sustained Commercially Reasonable Efforts to Commercialize at least **[***]** Licensed Product in the Territory, including the Major Market Countries. Without limiting the foregoing, Retrophin shall:

6.1.1 use Commercially Reasonable Efforts to obtain Approvals in a Major Market Country with respect to at least **[***]** Licensed Product and to effect the First Commercial Sale thereof in such country as soon as reasonably practicable after receipt of such Approvals;

6.1.2 Initiation of a Phase 2 Trial for at least **[***]** Licensed Compound no later than **[***]**;

6.1.3 File for Approval for at least **[***]** Orphan Licensed Product no later than **[***]**; and

6.1.4 File for Approval for at least **[***]** Licensed Product other than the first Orphan Licensed Product no later than **[***]**.

6.2 Continued Availability. Following the First Commercial Sale of a Licensed Product in a Major Market Country in the Territory and until the expiration or termination of this Agreement, Retrophin shall use Commercially Reasonable Efforts to supply and keep such Licensed Product reasonably available to the public in such country.

6.3 Marking. Each Licensed Product Commercialized by Retrophin under this Agreement shall be marked (to the extent not prohibited by applicable Laws): (i) with a notice that such Licensed Product is sold under a license from BMS and Ligand and (ii) with applicable patent and other intellectual property notices relating to the Core Patent Rights in such a manner as may be required by applicable Law.

6.4 Reports. Retrophin shall provide Ligand with semi-annual written reports within **[***]** days following the end of June and December of each **[***]** summarizing significant commercial activities and events with respect to Licensed Products during the just ended six month period.

ARTICLE 7.

MANUFACTURE AND SUPPLY

7.1 Manufacture and Supply. Retrophin shall be solely responsible at its expense for making or having made all of its requirements of the Licensed Compounds and Licensed Products.

ARTICLE 8.

FINANCIAL TERMS

8.1 Consideration. In partial consideration of the rights granted by Ligand to Retrophin pursuant to this Agreement, Retrophin shall make the payments to Ligand as provided for in this Article 8.

8.2 Development Milestone Payments.

8.2.1 Development Milestone Payments. Retrophin shall make milestone payments to Ligand upon achievement of each of the milestone events in the amounts set forth below in Table 1. The first milestone payment shall be payable by Retrophin to Ligand within **[***]** days of execution of the Agreement. Notwithstanding Section 15.4 or any other provision herein, the last milestone payment shall be payable by Retrophin to Ligand upon the Closing of Retrophin's Exit Transaction. Subject to Section 8.2.2, the remainder of the milestone payments set forth below will be payable by Retrophin to Ligand within **[***]** days of the achievement of the specified milestone event with

respect to each Licensed Compound. The milestone payments shall not be refundable or returnable in any event, nor shall they be creditable against royalties or other payments.

Table 1

Milestone Event	Milestone Payment
Execution of Agreement	$1.15 million
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**
[***]	**$[***]**

In the event that a milestone event is achieved that triggers a development milestone payment as set forth above, if the **[***]**. For example, **[***]**.

8.2.2 **[***]**.

8.2.3 **[***]**.

8.3 Royalty Payments.

8.3.1 Retrophin shall pay to Ligand in cash the following royalty payments on the total aggregate annual Net Sales in the Territory of all Licensed Products in a particular **[***]** by Retrophin, its Affiliates, and Sublicensees in the Territory:

Aggregate Annual Worldwide Net Sales of All Licensed Products in a **[***]**	Royalty Rate for Licensed Products in a **[***]**
Up to **[***]** Dollars ($**[***]**)	**[***]** %
More than **[***]** Dollars ($**[***]**)	**[***]** %

By way of example, in a given **[***]**, if the aggregate annual worldwide Net Sales for all Licensed Products is $ **[***]**, the royalty payment under this Section 8.3.1 would be calculated in accordance with the following formula: **[***]** Million Dollars.

8.3.2 Royalty Term. Royalties shall be payable on a **[***]** of (i) **[***]** or (ii) **[***]** or (iii) **[***]**.

8.3.3 **[***]**. **[***]**. Prior to Retrophin or its Sublicensee exercising its **[***]** under this Section 8.3.3, Retrophin shall provide Ligand with **[***]**. The Parties shall discuss the best course of action to resolve such potential **[***]**, provided that such discussions shall not limit or delay Retrophin's or its Sublicensee's right to **[***]**.

Except as set forth above, **[***]**.

8.3.4 Royalty Conditions. The royalties under Section 8.3.1 shall be subject to the following conditions:

a) that only one royalty shall be due with respect to the same unit of Licensed Product;

b) that no royalties shall be due upon the sale or other transfer among Retrophin, its Affiliates, or Sublicensees, but in such cases the royalty shall be due and calculated upon Retrophin's or its Affiliate's or Sublicensee's Net Sales of Licensed Product to the first independent Third Party; and

c) no royalties shall accrue on the disposition of Licensed Product in reasonable quantities by Retrophin, its Affiliates or Sublicensees as part of an expanded access program, as *bona fide* samples, as part of Phase 4 Trials or as donations to non-profit institutions or government agencies for non-commercial purposes; *provided, however,* in each case, that neither Retrophin, its Affiliate or Sublicensees receives any payment for such Licensed Product.

8.4 Manner of Payment. All payments to be made by Retrophin hereunder shall be made in Dollars by wire transfer of immediately available funds to such United States bank account as shall be designated by Ligand. Late payments shall bear interest at the rate provided in Section 8.9.

8.5 Sales Reports and Royalty Payments. After the First Commercial Sale of a Licensed Product and during the term of this Agreement, Retrophin shall furnish to Ligand a written report, within **[***]** days after the end of each **[***]** (or portion thereof, if this Agreement terminates during a **[***]**), showing the amount of royalty due for such **[***]** (or portion thereof). Royalty payments for each **[***]** shall be due at the same time as such written report for the **[***]**. With each **[***]**, Retrophin shall deliver to Ligand a full and accurate accounting to include at least the following information:

[***]

[***]

[***]

[***]

[***]

If no royalty or payment is due for any royalty period hereunder, Retrophin shall so report.

8.6 Sales Record Audit. Retrophin shall keep, and shall cause each of its Affiliates, and Sublicensees, if any, to keep, full and accurate books of accounting in accordance with GAAP as may be reasonably necessary for the purpose of calculating the royalties payable to Ligand. Such books of accounting (including those of Retrophin's

Affiliates, and Sublicensees, if any) shall be kept at their principal place of business and, with all necessary supporting data, shall during all reasonable times for the **[***]** years next following the end of the **[***]** to which each shall pertain, be open for inspection at reasonable times upon written notice by Ligand and at Ligand's sole cost, no more than once per any **[***]** month period, by an independent nationally recognized certified public accounting firm selected by Ligand as to which Retrophin has no reasonable objection, for the purpose of verifying royalty statements for compliance with this Agreement. Such accountant must have agreed in writing to maintain all information learned in confidence, except as necessary to disclose to Ligand such compliance or noncompliance by Retrophin. The results of each inspection, if any, shall be**[***]**. Ligand shall pay for such inspections, except that in the event there is any upward adjustment in aggregate royalties payable for the **[***]** period of such inspection of more than **[***]** of the amount paid, Retrophin shall pay for the reasonable out-of-pocket costs of such inspection. Any underpayments shall be paid by Retrophin within **[***]** of notification of the results of such inspection. Any overpayments shall be fully creditable against amounts payable in subsequent payment periods or, if no such amounts become payable within **[***]** days after notification of such results, shall be refunded.

8.7 Currency Exchange. With respect to Net Sales invoiced in Dollars, the Net Sales and the amounts due to Ligand hereunder shall be expressed in Dollars. With respect to Net Sales invoiced in a currency other than Dollars, the Net Sales shall be expressed in the domestic currency of the entity making the sale, together with the Dollar equivalent, calculated using the arithmetic average of the spot rates on the close of business on the last Business Day of **[***]** in which the Net Sales were made. The "closing mid-point rates" found in the "dollar spot forward against the dollar" table published by The Financial Times, or any other publication as may be agreed to by the Parties in writing, shall be used as the source of spot rates to calculate the average as defined in the preceding sentence. All payments shall be made in Dollars.

8.8 Tax Withholding. In the event that any withholding taxes or similar charges are levied or assessed by any taxing authority in the Territory with respect to payments made by Retrophin to Ligand under this Agreement, Retrophin shall pay such taxes or similar charges to the proper taxing authority. Retrophin may deduct the amount of such taxes or similar charges paid by Retrophin to such taxing authority from the applicable royalties or other payment otherwise payable to Ligand, subject to the following. Retrophin shall promptly provide Ligand with evidence of such tax payment obligation together with an original receipt for such tax payments (or a certified copy, if the original is not available) and other documentation as Ligand reasonably determines is required for the purpose of Ligand's tax returns. Retrophin, its Affiliates and Sublicensees shall cooperate with Ligand to enable the claiming of a reduction or exemption from withholding taxes on payments under any applicable convention on the avoidance of double taxation or similar agreement in force and shall provide to Ligand proper evidence of payments of withholding tax and assist Ligand by obtaining or providing in as far as possible the required documentation for the purpose of Ligand's tax returns. Retrophin's obligation vis-a-vis the tax authorities shall remain unaffected by the provisions of this Section 8.8.

8.9 Interest Due. Without limiting any other rights or remedies available to Ligand, Retrophin shall pay Ligand interest on any payments that are not paid on or before the date **[***]** days after the date such payments are due under this Agreement at a rate of one and **[***]** per month or the maximum applicable legal rate, if less, calculated on the total number of days payment is delinquent.

8.10 **[***]**.

8.10.1 In addition to the above milestone and royalty payments, Retrophin shall pay to Ligand the following **[***]**:

a) **[***]**; and

b) **[***]**.

8.10.2 **[***]**:

[***]	**[***]**
[***]	**[***]**
[***]	**[***]**

8.10.3 Such **[***]**. Such **[***]** to Ligand shall be due within **[***]** days following **[***]**.

8.10.4 For purposes of this Section 8.10, **[***],** but does not include (i) **[***]** or (ii) **[***]**.

ARTICLE 9.

REPRESENTATIONS AND WARRANTIES; DISCLAIMER;
LIMITATION OF LIABILITY

9.1 Mutual Representations and Warranties. Each Party represents and warrants to the other Party that (i) it has all requisite corporate power and authority to enter into this Agreement and to perform its obligations under this Agreement, (ii) execution of this Agreement and the performance by such Party of its obligations hereunder have been duly authorized, (iii) this Agreement is legally binding and enforceable on such Party in accordance with its terms and (iv) the performance of this Agreement by it does not create a material breach or material default under any other agreement to which it is a Party.

9.2 Representations, Warranties and Covenants of Ligand. Ligand represents, warrants and covenants that as of the Effective Date: (i) there is no litigation pending, or to the knowledge of Ligand threatened, which alleges, or any written communication alleging, that Ligand's activities with respect to the Patent Rights or the Licensed Compounds have infringed or misappropriated any of the intellectual property rights of any Third Party, (ii) all fees (including legal fees) required to be paid by Ligand in order to maintain the Patent Rights have been paid to date, (iii) it has not previously granted, assigned, transferred, conveyed, encumbered, mortgaged, pledged, hypothesized or licensed (or granted an option to assign, transfer, convey, encumber, mortgage, pledge, hypothesize or license) its right, title and interest in the Patent Rights or the Know-How, (iv) all of its actions related to its use of the Patent Rights and Know-How and the Development and Commercialization of the Licensed Compounds and Licensed Products complied with all applicable legal requirements and complied in all material respects with all regulatory requirements (except for the actions of Ligand's clinical research organization, Cetero Research, as to which no representations or warranties are made hereunder), (v) to the knowledge of Ligand (A) the Patent Rights and Know-How are subsisting, valid and enforceable and Ligand has not received any notice of a claim alleging that any of the Patent Rights infringes or otherwise violates any intellectual property or proprietary right of any Third Party, (B) the manufacture, Development and

Commercialization of the Listed Compound by Ligand did not interfere with the intellectual property rights of Third Parties, (C) it has not received any notice that any Person is infringing the Patent Rights and (D) it has not received any notice that a patent application within the Patent Rights is the subject of any pending interference, opposition, cancellation, protest or other challenge or adversarial proceeding, (vi) it has complied with the terms and conditions of the Upstream License Agreement in all material respects and has the necessary right, title and power to sublicense the Patent Rights or the Know-How, (vii) it has discontinued its internal drug discovery and development programs for the Listed Compound and that it has no active internal programs for the discovery or development of the Listed Compound and (vii) other than the Core Patent Rights, Ligand does not Control any patent(s) or patent application(s) that are reasonably necessary or useful for the Development or Commercialization of any Listed Compound or that claims the composition of matter of any Listed Compound or a method of manufacture or use of any Listed Compound.

9.3 Representations, Warranties and Covenants of Retrophin.

9.3.1 Retrophin covenants that (i) all of its activities related to its use of the Patent Rights and Know-How, and the Development and Commercialization of the Licensed Compounds and Licensed Products, pursuant to this Agreement shall comply with all applicable legal and regulatory requirements and (ii) it shall not knowingly engage in any activities (A) that use the Patent Rights and/or Know-How in a manner that is outside the scope of the license rights granted to it hereunder or (B) that infringe the intellectual property rights of any Third Party.

9.3.2 Retrophin has not, directly or indirectly, offered, promised, paid, authorized or given, and will not in the future, offer, promise, pay, authorize or give, money or anything of value, directly or indirectly, to any Government Official (as defined below) or Other Covered Party (as defined below) for the purpose of: (i) influencing any act or decision of the Government Official or Other Covered Party; (ii) inducing the Government Official or Other Covered Party to do or omit to do an act in violation of a lawful duty; (iii) securing any improper advantage; or (iv) inducing the Government Official or Other Covered Party to influence the act or decision of a government or government instrumentality, in order to obtain or retain business, or direct business to, any person or entity, in any way related to this Agreement. For purposes of this Agreement: (i) "Government Official" means any official, officer, employee or representative of: (A) any federal, state, provincial, county or municipal government or any department or agency thereof; (B) any public international organization or any department or agency thereof; or (C) any company or other entity owned or controlled by any government; and (ii) "Other Covered Party" means any political party or party official, or any candidate for political office.

9.3.3 Retrophin maintains and shall maintain a system of internal accounting controls sufficient to provide reasonable assurances that (i) transactions are executed in accordance with management's general or specific authorization; (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with GAAP and to maintain accountability for assets, including records of payments to any third parties, Government Officials and Other Covered Parties; (iii) access to assets is permitted only in accordance with management's general or specific authorization; and (iv) the recorded accountability for assets is compared with existing assets at reasonable intervals and appropriate action is taken with respect to any differences.

9.3.4 Anti-Corruption Compliance.

9.3.4.1 In performing under this Agreement, Retrophin and its Affiliates agree to comply with all applicable anti-corruption laws, including Foreign Corrupt Practices Act of 1977, as amended ("FCPA") and all laws enacted to implement the OECD Convention on Combating Bribery of Foreign Officials in International Business Transactions.

9.3.4.2 Any third party who represents Retrophin or its Affiliates in connection with, or who will be involved in performing, this Agreement or any related activity, shall certify to compliance with all applicable anti-corruption laws and the obligations set forth in this Section 9.3.5 prior to any involvement in this Agreement or any related activity.

9.3.4.3 Retrophin is not aware of any Government Official or Other Covered Party having any financial interest in the subject matter of this Agreement or in any way personally benefiting, directly or indirectly, from this Agreement.

9.3.4.4 No political contributions or charitable donations shall be given, offered, promised or paid at the request of any Government Official or Other Covered Party that is in any way related to this Agreement or any related activity, without Ligand's prior written approval.

9.3.4.5 In the event that Retrophin violates the FCPA or any applicable anti-corruption law or breaches any provision in this Section 9.3, Ligand shall have the right to unilaterally terminate this Agreement.

9.4 Disclaimer. EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER PARTY MAKES ANY REPRESENTATIONS OR WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ANY PATENT RIGHTS, CONFIDENTIAL INFORMATION OR KNOW-HOW OF SUCH PARTY OR ANY LICENSE GRANTED BY SUCH PARTY HEREUNDER, OR WITH RESPECT TO ANY COMPOUNDS, INCLUDING BUT NOT LIMITED TO THE TRANSFERRED MATERIALS, OR PRODUCTS. FURTHERMORE, EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER PARTY MAKES ANY REPRESENTATIONS OR WARRANTIES THAT ANY PATENT, PATENT APPLICATION, OR OTHER PROPRIETARY RIGHTS INCLUDED IN PATENT RIGHTS, CONFIDENTIAL INFORMATION OR KNOW-HOW LICENSED BY SUCH PARTY TO THE OTHER PARTY HEREUNDER ARE VALID OR ENFORCEABLE OR THAT USE OF SUCH PATENT RIGHTS, CONFIDENTIAL INFORMATION OR KNOW-HOW CONTEMPLATED HEREUNDER DOES NOT INFRINGE ANY PATENT RIGHTS OR OTHER INTELLECTUAL PROPERTY RIGHTS OF ANY THIRD PARTY.

9.5 Limitation of Liability. NOTWITHSTANDING ANYTHING IN THIS AGREEMENT OR OTHERWISE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER WITH RESPECT TO ANY SUBJECT MATTER OF THIS AGREEMENT, WHETHER UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY, FOR ANY INCIDENTAL, INDIRECT, SPECIAL, EXEMPLARY, PUNITIVE, MULTIPLE, OR CONSEQUENTIAL

DAMAGES (INCLUDING CONSEQUENTIAL DAMAGES CONSISTING OF LOST PROFITS, LOSS OF USE, DAMAGE TO GOODWILL, OR LOSS OF BUSINESS) AND, IN ANY CASE, LIGAND SHALL NOT BE LIABLE IN AN AMOUNT GREATER THAN THE AMOUNTS PAID BY RETROPHIN TO LIGAND UNDER ARTICLE 8 OF THIS AGREEMENT; *PROVIDED*, *HOWEVER*, THAT THE FOREGOING SHALL NOT APPLY TO ANY BREACH BY RETROPHIN OF THE LICENSES GRANTED TO IT UNDER THIS AGREEMENT THAT IS AN INFRINGEMENT OF PATENT RIGHTS NOT INCLUDED IN THE PATENT RIGHTS LICENSED TO RETROPHIN HEREUNDER, OR ANY BREACH BY EITHER PARTY OF THIS ARTICLE 9 OR ARTICLE 11 HEREOF.

ARTICLE 10.

OWNERSHIP; PATENT MAINTENANCE; INFRINGEMENT; EXTENSIONS

10.1 Ownership of Inventions. Inventorship of inventions conceived or reduced to practice in the course of activities performed under or contemplated by this Agreement shall be determined by application of United States patent Laws pertaining to inventorship. If such inventions are jointly invented by one or more employees, consultants or contractors of each Party, such inventions shall be jointly owned ("Joint Invention"), and if one or more claims included in an issued patent or pending patent application which is filed in a patent office in the Territory claim such Joint Invention, such claims shall be jointly owned ("Joint Patent Rights"). If such an invention is solely invented by an employee, consultant or contractor of a Party, such invention shall be owned by such Party, and any patent filed claiming such solely owned invention shall also be owned by such Party. Subject to Section 5.6 with respect to contractors, each Party shall enter into binding agreements obligating all employees, consultants and contractors performing activities under or contemplated by this Agreement, including activities related to the Patent Rights, Licensed Compounds or Licensed Products, to assign his/her interest in any invention conceived or reduced to practice in the course of such activities to the Party for which such employee, consultant or contractor is providing its services. This Agreement shall be understood to be a joint research agreement in accordance with 35 U.S.C. § 103(c)(3) to develop the Licensed Compounds and Licensed Products. The filing, prosecution, maintenance and enforcement of Joint Patent Rights which are Core Patent Rights shall be handled in accordance with this Article 10.

10.2 Filing, Prosecution and Maintenance of Core Patent Rights. Retrophin shall be responsible, using outside patent counsel selected by Retrophin and acceptable to Ligand, such acceptance not to be unreasonably withheld or delayed, for the preparation, prosecution (including, without limitation, any interferences, reissue proceedings and reexaminations) and maintenance of Core Patent Rights. Promptly following the Effective Date, the Parties shall cooperate to expeditiously transfer such responsibility for the further preparation, prosecution and maintenance of Core Patent Rights to such outside patent counsel. Retrophin shall be responsible for all costs incurred by Retrophin with respect to such preparation, prosecution and maintenance of Core Patent Rights so long as Retrophin remains responsible for such preparation, prosecution and maintenance. Upon request by Ligand, Retrophin (or its patent counsel) shall provide Ligand with an update of the filing, prosecution and maintenance status for each of the Core Patent Rights. Each Party shall reasonably consult with and cooperate with the other Party with respect to the preparation, prosecution and maintenance of the Core Patent Rights reasonably prior to any deadline or action with the U.S. Patent & Trademark Office or any foreign patent office, and Retrophin (or its patent counsel) shall furnish to Ligand copies of all relevant documents reasonably in advance of such consultation. Retrophin (or its patent counsel) shall provide to Ligand

copies of any papers relating to the filing, prosecution or maintenance of the Core Patent Rights promptly upon their being filed or received. Retrophin shall not knowingly take any action during prosecution and maintenance of the Core Patent Rights that would materially adversely affect them (including any reduction in claim scope), without Ligand's prior consent, such consent not to be unreasonably withheld, conditioned or delayed.

10.3 Patent Abandonment.

10.3.1 Generally. In no event will Retrophin knowingly permit any of the Core Patent Rights to be abandoned in any country in the Territory or elect not to file a new patent application claiming priority to a patent application within the Core Patent Rights either before such patent application's issuance or within the time period required for the filing of an international (i.e., Patent Cooperation Treaty), regional (including European Patent Office) or national application, without Ligand first being given an opportunity to assume full responsibility for the continued prosecution and maintenance of such Core Patent Rights, or the filing of such new patent application. Accordingly, Retrophin (or its patent counsel) shall provide Ligand with notice of the allowance and expected issuance date of any patent within the Core Patent Rights, or any of the aforementioned filing deadlines, and Ligand shall provide Retrophin with prompt notice as to whether Ligand desires Retrophin to file such new patent application. In the event that Retrophin decides either (i) not to continue the prosecution or maintenance of a patent application or patent within Core Patent Rights in any country or (ii) not to file such new patent application requested to be filed by Ligand, Retrophin shall provide Ligand with notice of this decision at least **[***]** days prior to any pending lapse or abandonment thereof.

10.3.2 Ligand Option to Assume Responsibility. Ligand shall thereupon have the right, but not the obligation, to assume responsibility for all reasonably documented external costs (subject to Section 10.3.3) thereafter incurred associated with the filing and/or further prosecution and maintenance of such patents and patent applications, on a patent-by-patent and country-by-country basis. The outside patent counsel selected by Retrophin shall proceed with such filing and/or further prosecution and maintenance promptly upon receipt of written notice from Ligand of its election to assume such responsibility, with such filing to occur prior to the issuance of the patent to which the application claims priority or expiration of the applicable filing deadline, as set forth above. In the event that Ligand assumes such responsibility for such filing, prosecution and maintenance costs (subject to Section 10.3.3), upon the reasonable request by Ligand, Retrophin shall transfer the responsibility for such filing, prosecution and maintenance of such patent applications and patents to outside patent counsel selected by Ligand; *provided, however,* Retrophin shall (i) provide sufficient written notice to Ligand of any such election such that the relevant transfer shall not prejudice the filing, prosecution and/or maintenance of patent rights (where possible, such notice shall be provided at least **[***]** days prior to any pending lapse or abandonment thereof); (ii) transfer or cause to be transferred to Ligand or its patent counsel the complete prosecution file for the relevant patents and patent applications, including all correspondence and filings with patent authorities with respect thereto; and (iii) at the reasonable request of Ligand and without demanding any further consideration therefore, do all things necessary, proper or advisable, including without limitation the execution, acknowledgment and recordation of specific assignments, oaths, declarations and other documents on a country-by-country basis, to assist Ligand in obtaining, perfecting, sustaining and/or enforcing such patent(s). Such patent applications and patents shall

otherwise continue to be subject to all of the terms and conditions of the Agreement in the same way as the other Core Patent Rights, as applicable.

10.3.3 Retrophin Responsibility for Patent Costs. Notwithstanding anything to the contrary under this Article 10, unless the Parties otherwise agree in writing, Retrophin shall remain responsible for all costs incurred after the Effective Date with respect to preparation, prosecution and maintenance of the Core Patent Rights covering Licensed Compounds.

10.4 Enforcement of Core Patent Rights Against Infringers.

10.4.1 Enforcement by Retrophin.

a) In the event that Ligand or Retrophin becomes aware of a suspected infringement of any Core Patent Right exclusively licensed to Retrophin under this Agreement, such Party shall notify the other Party promptly, and following such notification, the Parties shall confer. Retrophin shall have the right, but shall not be obligated, to bring an infringement action with respect to such infringement at its own expense, in its own name and entirely under its own direction and control, subject to the following. Ligand shall reasonably assist Retrophin (at Retrophin's expense) in any action or proceeding being prosecuted if so requested, and shall lend its name to and join as a nominal party in such actions or proceedings if reasonably requested by Retrophin or required by applicable Laws. Ligand shall have the right to participate and be represented in any such suit by its own counsel at its own expense. No settlement of any such action or proceeding which restricts the scope, or adversely affects the enforceability, of a Core Patent Right may be entered into by Retrophin without the prior written consent of Ligand, which consent shall not be unreasonably withheld, delayed or conditioned.

b) Ligand shall have the right at its discretion to grant to Retrophin such rights (including assignment of the applicable Core Patent Rights) as may be necessary for Retrophin to exercise its rights under this Section 10.4 (including defending or enforcing any Core Patent Rights) without Ligand's involvement. In the event of such grant of rights (including assignment) with respect to any Core Patent Rights, such Core Patent Rights shall continue to be treated as Core Patent Rights and shall otherwise continue to be subject to all of the terms and conditions of the Agreement in the same way as the other applicable Core Patent Rights. For purposes of clarity, election or non-election by Ligand to grant or assign rights to Retrophin under this Section 10.4.1(b) shall not limit Ligand's obligations under Section 10.4.1(a) to reasonably assist Retrophin in any action or proceeding, or to join in such action or proceeding upon request by Retrophin if such joinder is necessary under applicable Laws for Retrophin to exercise its rights under this Section 10.4.

10.4.2 Enforcement by Ligand. If Retrophin elects not to bring any action for infringement described in Section 10.4.1 and so notifies Ligand, then Ligand may bring such action at its own expense, in its own name and entirely under its own direction and control, subject to the following. Retrophin shall reasonably assist Ligand (at Ligand's expense) in any action or proceeding being prosecuted if so requested, and shall lend its name to such actions or proceedings if requested by Ligand or required by applicable Laws. Retrophin shall have the right to participate and be represented in any such suit by its own counsel at its own expense. No settlement of any such action or proceeding which restricts the scope, or adversely affects the enforceability, of a Core

Patent Right may be entered into by Ligand without the prior written consent of Retrophin, which consent shall not be unreasonably withheld, delayed or conditioned.

10.4.3 Withdrawal. If either Party brings an action or proceeding under this Section 10.4 and subsequently ceases to pursue or withdraws from such action or proceeding, it shall promptly notify the other Party and the other Party may substitute itself for the withdrawing Party under the terms of this Section 10.4.

10.4.4 Damages. In the event that either Party exercises the rights conferred in this Section 10.4 and recovers any damages or other sums in such action, suit or proceeding or in settlement thereof, such damages or other sums recovered shall **[***]**. If such recovery is insufficient **[***]**. If after such **[***]** any funds shall remain from such damages or other sums recovered, such funds shall be **[***]** under this Section 10.4; *provided*, *however*, that if **[***]**.

10.5 Patent Term Extension. Ligand and Retrophin shall each cooperate with one another and shall use commercially reasonable efforts in obtaining patent term extension (including without limitation, any pediatric exclusivity extensions as may be available) or supplemental protection certificates or their equivalents in any country with respect to patent rights covering the Licensed Products. If elections with respect to obtaining such patent term extensions are to be made, Retrophin shall have the right to make the election to seek patent term extension or supplemental protection; *provided*, *however,* such election will be made so as to maximize the period of marketing exclusivity for the Licensed Product. For such purpose, for all Approvals Retrophin shall provide Ligand with written notice of any expected Approval at least **[***]** days prior to the expected date of Approval, as well as notice within **[***]** business days of receiving each Approval confirming the date of such Approval. Notification of the receipt of an Approval shall be in accordance with Section 15.2.

10.6 Data Exclusivity and Orange Book Listings.

10.6.1 With respect to data exclusivity periods (such as those periods listed in the FDA's Orange Book (including without limitation any available pediatric extensions) or periods under national implementations of Article 10.1(a)(iii) of Directive 2001/EC/83, and all international equivalents), Retrophin shall use commercially reasonable efforts consistent with its obligations under applicable Law to seek, maintain and enforce all such data exclusivity periods available for the Licensed Products. With respect to filings in the FDA Orange Book (and foreign equivalents) for issued patents for a Licensed Product, Retrophin shall, consistent with its obligations under applicable Law, list in a timely manner and maintain all applicable Core Patent Rights and other patents Controlled by Retrophin required to be filed by it, or that it is permitted to file, under applicable Law. At least **[***]** days prior to an anticipated deadline for the filing of patent listing information for Core Patent Rights, Retrophin will consult with Ligand regarding the content of such filing. In the event of a dispute between the Parties as to whether a Core Patent Right can be filed and/or the content of such filing, the Parties will take expedited steps to resolve the dispute as promptly as possible, including seeking advice of an independent legal counsel to guide their decision. Ligand shall use commercially reasonable efforts consistent with its obligations under applicable Law to provide reasonable cooperation to Retrophin in filing and maintaining such Orange Book (and foreign equivalent) listings.

10.6.2 Without limiting the foregoing, Ligand shall have the right at its discretion to grant to Retrophin such rights (including assignment of the applicable Core

Patent Rights) as may be necessary for Retrophin to exercise its rights under this Section 10.6 (including seeking, maintaining and enforcing all data exclusivity periods) without Ligand's involvement. In the event of such grant of rights (including assignment) with respect to any Core Patent Rights, such Core Patent Rights shall continue to be treated as Core Patent Rights and shall otherwise continue to be subject to all of the terms and conditions of the Agreement in the same way as the other applicable Core Patent Rights. For purposes of clarity, election by Ligand to grant or assign rights to Retrophin under this Section 10.6.2 shall not limit Ligand's obligation under Section 10.6.1 to provide reasonable cooperation to Retrophin to the extent such cooperation is reasonably necessary for Retrophin in filing and maintaining such Orange Book (and foreign equivalent) listings.

10.7 Notification of Patent Certification. Each Party shall notify and provide the other Party with copies of any allegations of alleged patent invalidity, enforceability or non-infringement of a Core Patent Right pursuant to a Paragraph IV Patent Certification by a Third Party filing an Abbreviated NDA, an application under §505(b)(2) or other similar patent certification by a Third Party, and any foreign equivalent thereof. Such notification and copies shall be provided to the other Party within **[***]** days after such Party receives such certification, and shall be sent to the address set forth in Section 15.2. In addition, upon request by Ligand, Retrophin shall provide reasonable assistance and cooperation (including, without limitation, making available to Ligand documents possessed by Retrophin that are reasonably required by Ligand and making available personnel for interviews and testimony) in any actions reasonably undertaken by Ligand to contest any such patent certification.

ARTICLE 11.

NONDISCLOSURE OF CONFIDENTIAL INFORMATION

11.1 Nondisclosure. Each Party agrees that, for so long as this Agreement is in effect and for a period of **[***]** years thereafter, a Party (the "Receiving Party") receiving or possessing Confidential Information of the other Party (the "Disclosing Party") (or that has received any such Confidential Information from the other Party prior to the Effective Date) shall (i) maintain in confidence such Confidential Information using not less than the efforts such Receiving Party uses to maintain in confidence its own proprietary information of similar kind and value, but in no event shall the Receiving Party use less than a reasonable standard of care, (ii) not disclose such Confidential Information to any Third Party without the prior written consent of the Disclosing Party, except for disclosures expressly permitted below, and (iii) not use such Confidential Information for any purpose except those permitted by this Agreement (it being understood that this clause (iii) shall not create or imply any rights or licenses not expressly granted hereunder).

11.1.1 Confidentiality of Know-How for Disclosure Purposes. During such time as the license to the Know-How granted under Section 2.1 is in effect, solely for disclosure purposes to Third Parties, the Know-How shall be deemed to be Confidential Information of Ligand and Retrophin under Article 11, Ligand and Retrophin shall be deemed to be a Disclosing Party of the Know-How under Article 11, and Ligand and its respective Affiliates shall be deemed not to have known such Know-How prior to disclosure for the purposes of Section 11.1.2(b). Other than for disclosure purposes to Third Parties, the Know-How shall solely be the Confidential Information of Ligand.

11.1.2 Exceptions. The obligations in Section 11.1 shall not apply with respect to any portion of the Confidential Information that the Receiving Party can show by competent proof:

a) is publicly disclosed by the Disclosing Party, either before or after it is disclosed to the Receiving Party hereunder;

b) was known to the Receiving Party or any of its Affiliates, without any obligation to keep it confidential or any restriction on its use, prior to disclosure by the Disclosing Party;

c) is subsequently disclosed to the Receiving Party or any of its Affiliates by a Third Party lawfully in possession thereof and without any obligation to keep it confidential or any restriction on its use;

d) is published by a Third Party or otherwise becomes publicly available or enters the public domain, either before or after it is disclosed to the Receiving Party; or

e) has been independently developed after disclosure by the Disclosing Party by employees or contractors of the Receiving Party or any of its Affiliates without the aid, application or use of Confidential Information of the Disclosing Party.

11.2 Authorized Disclosure. The Receiving Party may disclose Confidential Information belonging to the Disclosing Party to the extent (and only to the extent) such disclosure is reasonably necessary in the following instances:

a) filing or prosecuting patents;

b) regulatory filings;

c) prosecuting or defending litigation;

d) subject to Section 11.4, complying with applicable governmental Laws and regulations (including the rules and regulations of the Securities and Exchange Commission or any national securities exchange) and with judicial process, if in the reasonable opinion of the Receiving Party's counsel, such disclosure is necessary for such compliance; and

e) disclosure (i) in connection with the performance of this Agreement and solely on a "need to know basis" to Affiliates, potential or actual collaborators (including potential Sublicensees) or employees, contractors or agents; or (ii) solely on a "need to know basis" to potential or actual investment bankers, investors, lenders, or acquirers; each of whom in the case of clause (i) or (ii) prior to disclosure must be bound by written obligations of confidentiality and non-use no less restrictive than the obligations set forth in this Article 11; *provided*, *however*, that the Receiving Party shall remain responsible for any failure by any Person who receives Confidential Information pursuant to this Article 11 to treat such Confidential Information as required under this Article 11.

If and whenever any Confidential Information is disclosed in accordance with this Section 11.2, such disclosure shall not cause any such information to cease to be Confidential Information except to the extent that such disclosure results in a public

disclosure of such information (otherwise than by breach of this Agreement). Where reasonably possible and subject to Section 11.4, the Receiving Party shall notify the Disclosing Party of the Receiving Party's intent to make such disclosure pursuant to paragraphs (r) through (v) of this Section 11.2 sufficiently prior to making such disclosure so as to allow the Disclosing Party adequate time to take whatever action it may deem appropriate to protect the confidentiality of the information.

11.3 Terms of this Agreement. The Parties acknowledge that the terms of this Agreement shall be treated as Confidential Information of both Parties.

11.4 Securities Filings. In the event either Party proposes to file with the Securities and Exchange Commission or the securities regulators of any state or other jurisdiction a registration statement or any other disclosure document which describes or refers to this Agreement under the Securities Act of 1933, as amended, the Securities Exchange Act of 1934, as amended, or any other applicable Laws, the Party shall notify the other Party of such intention and shall provide such other Party with a copy of relevant portions of the proposed filing not less than **[***]** business days prior to such filing (and any revisions to such portions of the proposed filing a reasonable time prior to the filing thereof), including any exhibits thereto relating to this Agreement and shall use reasonable efforts to obtain confidential treatment of any information concerning this Agreement that such other Party requests be kept confidential and shall only disclose Confidential Information which it is advised by counsel is legally required to be disclosed. No such notice shall be required under this Section 11.4 if the substance of the description of or reference to this Agreement contained in the proposed filing has been included in any previous filing made by the other Party hereunder or otherwise approved by the other Party.

11.5 Publication.

11.5.1 Publication by Ligand. Ligand may publish or present data and/or results relating to a Licensed Compound or Licensed Product in scientific journals and/or at scientific conferences, subject to the prior review, comment and approval by Retrophin as follows. Ligand shall provide Retrophin with the opportunity to review any proposed abstract, manuscript or presentation which discloses information relating to a Licensed Compound or Licensed Product by delivering a copy thereof to Retrophin no less than **[***]** days before its intended submission for publication or presentation. Retrophin shall have twenty (20) days from its receipt of any such abstract, manuscript or presentation in which to notify Ligand in writing of any specific objections to the disclosure. In the event Retrophin objects to the disclosure in writing within such **[***]** day period, Ligand agrees not to submit the publication or abstract or make the presentation containing the objected-to information until the Parties have agreed to the content of the proposed disclosure and Ligand shall delete from the proposed disclosure any Retrophin Confidential Information or Know-How or the identity of any Licensed Compound or Licensed Product, or any information relating to the Licensed Compound or its improvements that could limit or jeopardize any rights of Retrophin, upon reasonable request by Retrophin. Failure to object to the disclosure in writing within such **[***]** day period shall be deemed approval. Once any such abstract or manuscript is accepted for publication, Ligand will provide Retrophin with a copy of the final version of the manuscript or abstract. For clarification, this Section 11.5.1 shall not limit or restrict Ligand's ability to publish or present publicly information on compounds which are not Licensed Compounds or Licensed Products, provided such publication or presentation does not contain Retrophin Confidential Information or identify any

Licensed Compound or Licensed Product. Retrophin acknowledges BMS' right to publish or otherwise publicly disclose any licensed BMS Know-How at any time.

11.5.2 Publication by Retrophin. Retrophin may publish or present data and/or results relating to a Licensed Compound or Licensed Product in scientific journals and/or at scientific conferences, subject to attribution to Ligand of any data generated by or on behalf of Ligand prior to the Effective Date as well as the prior review and comment by Ligand as follows. Retrophin shall provide Ligand with the opportunity to review any proposed abstract, manuscript or presentation which discloses information relating to a Licensed Compound or Licensed Product by delivering a copy thereof to Ligand no less than **[***]** days before its intended submission for publication or presentation. Ligand shall have **[***]** days from its receipt of any such abstract, manuscript or presentation in which to notify Retrophin in writing of any specific objections to the disclosure, such objections to be limited to matters involving the disclosure of Ligand Confidential Information, or a good faith and documented concern by Ligand that such publication would otherwise result in material commercial harm to Ligand. In the event Ligand objects to the disclosure in writing within such **[***]** day period, Retrophin agrees not to submit the publication or abstract or make the presentation containing the objected-to information until the Parties have agreed to the content of the proposed disclosure, and Retrophin shall delete from the proposed disclosure any Ligand Confidential Information upon the reasonable request by Ligand. The Parties agree to take all reasonable steps to address and resolve a notice of objection by Ligand within **[***]** days of receipt of such notice. Once any such abstract or manuscript is accepted for publication, Retrophin will provide Ligand with a copy of the final version of the manuscript or abstract, a copy of which may be provided to BMS by Ligand.

ARTICLE 12.

INDEMNITY

12.1 Retrophin Indemnity. Retrophin shall indemnify, defend and hold harmless Ligand and its Affiliates, and their respective officers, directors, employees, agents, licensors, and their respective successors, heirs and assigns and representatives, from and against any and all claims, damages, losses, suits, proceedings, liabilities, costs (including reasonable legal expenses, costs of litigation and reasonable attorney's fees) or judgments, whether for money or equitable relief, of any kind, arising out of any claim, action, lawsuit or other proceeding brought by a Third Party ("Losses and Claims") arising out of or relating, directly or indirectly, (i) to the research, Development, Commercialization (including promotion, advertising, offering for sale, sale or other disposition), transfer, importation or exportation, manufacture, labeling, handling or storage, or use of, or exposure to, any Licensed Compound and/or any Licensed Product by or for Retrophin or any of its Affiliates, Sublicensees, agents and/or contractors, (ii) to Retrophin's (or its Affiliates' and/or Sublicensees') use and practice otherwise of the Patent Rights or Know-How, including claims based on (A) product liability, bodily injury, risk of bodily injury, death or property damage, (B) infringement or misappropriation of Third Party patents, copyrights, trademarks or other intellectual property rights or (C) the failure to comply with applicable Laws related to the matters referred to in the foregoing clauses (i) and (ii) with respect to any Licensed Compound and/or any Licensed Product, or (iii) Retrophin's gross negligence, recklessness or willful misconduct or Retrophin's material breach of any representation, warranty or covenant set forth in this Agreement; except in any such case for Losses and Claims to the extent reasonably attributable to Ligand having committed an act or acts of gross negligence, recklessness or willful

misconduct or having materially breached any representation or warranty set forth in this Agreement.

12.2 Ligand Indemnity. Ligand shall indemnify, defend and hold harmless Retrophin and its Affiliates, and their respective officers, directors, employees, agents, licensors, and their respective successors, heirs and assigns and representatives, from and against any and all Losses and Claims arising out of or relating, directly or indirectly to (i) Ligand's gross negligence, recklessness or willful misconduct or (ii) Ligand's material breach of any representation, warranty or covenant set forth in this Agreement; except in any such case for Losses and Claims to the extent reasonably attributable to Retrophin having committed an act or acts of gross negligence, recklessness or willful misconduct or having materially breached any representation or warranty set forth in this Agreement. For the avoidance of doubt, "Ligand's gross negligence, recklessness or willful misconduct" shall not include any acts or omissions on the part of any Third Parties, including Ligand's clinical research organization, Cetero Research.

12.3 Indemnification Procedure. A claim to which indemnification applies under Section 12.1 or Section 12.2 shall be referred to herein as an "Indemnification Claim". If any Person or Persons (collectively, the "Indemnitee") intends to claim indemnification under this Article 12, the Indemnitee shall notify the other Party (the "Indemnitor") in writing promptly upon becoming aware of any claim that may be an Indemnification Claim (it being understood and agreed, however, that the failure by an Indemnitee to give such notice shall not relieve the Indemnitor of its indemnification obligation under this Agreement except and only to the extent that the Indemnitor is actually prejudiced as a result of such failure to give notice). The Indemnitor shall have the right to assume and control the defense of the Indemnification Claim at its own expense with counsel selected by the Indemnitor and reasonably acceptable to the Indemnitee; *provided*, *however*, that an Indemnitee shall have the right to retain its own counsel, with the fees and expenses to be paid by the Indemnitee, if representation of such Indemnitee by the counsel retained by the Indemnitor would be inappropriate due to actual or potential differing interests between such Indemnitee and any other party represented by such counsel in such proceedings. If the Indemnitor does not assume the defense of the Indemnification Claim as aforesaid, the Indemnitee may defend the Indemnification Claim but shall have no obligation to do so. The Indemnitee shall not settle or compromise the Indemnification Claim without the prior written consent of the Indemnitor, and the Indemnitor shall not settle or compromise the Indemnification Claim in any manner which would have an adverse effect on the Indemnitee's interests (including any rights under this Agreement or the scope or enforceability of the Patents Rights or Know-How), without the prior written consent of the Indemnitee, which consent, in each case, shall not be unreasonably withheld or delayed. The Indemnitee shall reasonably cooperate with the Indemnitor at the Indemnitor's expense and shall make available to the Indemnitor all pertinent information under the control of the Indemnitee, which information shall be subject to Article 11.

12.4 Insurance. Retrophin shall, beginning with the initiation of the first clinical trial for a Licensed Product, maintain at all times thereafter during the term of the Agreement, and until the later of (i) **[***]** or (ii) the date **[***]**, comprehensive general liability insurance from a recognized, creditworthy insurance company, on a claims-made basis, with endorsements for contractual liability and product liability, and with coverage limits of not less than **[***]**. The minimum level of insurance set forth herein shall not be construed to create a limit on Retrophin's liability hereunder. Within **[***]** days following written request from Ligand, Retrophin shall furnish to Ligand a certificate of insurance

evidencing such coverage as of the date. Retrophin shall use commercially reasonable efforts to cause such certificate of insurance, as well as any certificates evidencing new coverages of Retrophin, to include a provision whereby **[***]** written notice shall be received by Ligand prior to coverage cancellation by either Retrophin or the insurer and of any new coverage. In the case of a cancellation of such coverage, Retrophin shall promptly provide Ligand with a new certificate of insurance evidencing that Retrophin's coverage meets the requirements in the first sentence of this Section 12.4.

ARTICLE 13.

TERM AND TERMINATION

13.1 Term. This Agreement shall commence as of the Effective Date and, unless sooner terminated in accordance with the terms hereof or by mutual written consent, shall continue until neither Party has any obligation under this Agreement to make payments to the other Party.

13.2 Termination By Ligand.

13.2.1 Insolvency. Ligand shall have the right to terminate this Agreement with respect to any or all licenses granted to Retrophin pursuant to Article 2 of this Agreement, at Ligand's sole discretion, upon delivery of written notice to Retrophin upon the filing by Retrophin in any court or agency pursuant to any statute or regulation of the United States or any other jurisdiction a petition in bankruptcy or insolvency or for reorganization or similar arrangement for the benefit of creditors or for the appointment of a receiver or trustee of Retrophin or its assets, or if Retrophin is served with an involuntary petition against it in any insolvency proceeding, upon the **[***]** day after such service if such involuntary petition has not previously been stayed or dismissed, or upon the making by Retrophin of an assignment of substantially all of its assets for the benefit of its creditors.

13.2.2 Breach. Subject to Section 13.2.4 below, Ligand shall have the right to terminate this Agreement with respect to any or all licenses granted to Retrophin pursuant to Article 2 of this Agreement, at Ligand's sole discretion, upon delivery of written notice to Retrophin in the event of any material breach by Retrophin of any terms and conditions of this Agreement (other than failure to use Commercially Reasonable Efforts to Develop or Commercialize the Licensed Compounds and a Licensed Product, which breach is covered under Section 13.2.3); *provided, however,* such breach has not been cured within forty-five (45) days after written notice thereof is given by Ligand to Retrophin specifying the nature of the alleged breach; *provided*, *however*, that to the extent such material breach involves the failure to make a payment when due, such breach must be cured within twenty (20) days after written notice thereof is given by Ligand to Retrophin.

13.2.3 Failure to Use Commercially Reasonable Efforts. Subject to Section 13.2.4 below, Ligand shall have the right to terminate this Agreement with respect to any or all licenses granted to Retrophin pursuant to Article 2 of this Agreement on a country-by-country basis (except as otherwise set forth in this Section 13.2.3), at Ligand's sole discretion, in the event that Retrophin (a) fails to use Commercially Reasonable Efforts (by itself or through its Affiliates or Sublicensees) to Develop and Commercialize at least one (1) Licensed Compound and Licensed Product or (b) fails to comply with the specific diligence obligations set forth in Sections 6.1.2 and 6.1.3 of this Agreement; *provided, however,* that Retrophin has not exercised such Commercially Reasonable Efforts or complied with such specific diligence obligations in the applicable

country or countries within sixty (60) days following written notice by Ligand. For clarity, it is understood and acknowledged that Commercially Reasonable Efforts in the Development of a Licensed Compound or Licensed Product in a particular country may include sequential implementation of clinical trials and/or intervals between clinical trials for data interpretation and clinical program planning and any period associated with such program, to the extent such implementation is consistent with the scientific, technical and commercial factors relevant to Development of such Licensed Compound or Licensed Product in such country.

13.2.4 Disputed Breach. If Retrophin disputes in good faith the existence or materiality of a breach specified in a notice provided by Ligand pursuant to Section 13.2.2, or a failure to use Commercially Reasonable Efforts specified in a notice provided by Ligand pursuant to Section 13.2.3, and Retrophin provides notice to Ligand of such dispute within the applicable forty-five (45) day or sixty (60) day period, Ligand shall not have the right to terminate this Agreement unless and until the existence of such material breach or failure by Retrophin has been determined in accordance with Article 14 and Retrophin fails to cure such breach within sixty (60) days following such determination (except to the extent such breach involves the failure to make a payment when due, which breach must be cured within five (5) Business Days following such determination). It is understood and acknowledged that during the pendency of such a dispute, all of the terms and conditions of this Agreement shall remain in effect and the Parties shall continue to perform all of their respective obligations hereunder. The Parties further agree that any payments that are made by one Party to the other Party pursuant to this Agreement pending resolution of the dispute shall be promptly refunded if an arbitrator or court determines pursuant to Article 14 that such payments are to be refunded by one Party to the other Party.

13.2.5 Termination for **[***]**. Subject to the terms of this Section 13.2.5, Ligand shall have the right to terminate this Agreement (on a country-by-country or worldwide basis, as Ligand may elect), **[***]**, in the event that (a) **[***]** or (b) **[***]**. In the event the Parties are unable to reach agreement regarding whether or not a compound is a **[***]**, and the Parties have not resolved such dispute through good faith discussions, such dispute will be resolved through performance of the relevant scientific determination by an independent Third Party testing provider or other scientific expert who shall be mutually and reasonably selected by both Parties. The findings of such Third Party scientific expert with respect to such dispute shall be binding on the Parties, and the costs of such testing shall be borne by the Party whom the independent determination does not favor.

13.2.6 Termination of Upstream License Agreement. Subject to Section 13.5.1, if the Upstream License Agreement, in whole or in part, is terminated for any reason, the corresponding rights granted to Retrophin shall be terminated effective upon termination of the Upstream License Agreement.

13.3 Termination by Retrophin. Retrophin may terminate this Agreement in the event of material breach by Ligand; *provided, however,* that such breach has not been cured within sixty (60) days after written notice thereof is given by Retrophin to Ligand. Notwithstanding the foregoing, if Ligand disputes in good faith the existence or materiality of such breach and provides notice to Retrophin of such dispute within such sixty (60) day period, Retrophin shall not have the right to terminate this Agreement in accordance with this Section 13.3 unless and until it has been determined in accordance with Article 14 that this Agreement was materially breached by Ligand and Ligand fails to cure such breach

within sixty (60) days following such determination. It is understood and acknowledged that during the pendency of such a dispute, all of the terms and conditions of this Agreement shall remain in effect and the Parties shall continue to perform all of their respective obligations hereunder. The Parties further agree that any payments that are made by one Party to the other Party pursuant to this Agreement pending resolution of the dispute shall be promptly refunded if an arbitrator or court determines pursuant to Article 14 that such payments are to be refunded by one Party to the other Party.

13.4 Effect of Termination. Upon termination of this Agreement or any right or license pursuant to Section 13.2.1, 13.2.2, 13.2.3 or 13.2.5, the rights and obligations of the Parties shall be as set forth in this Section 13.4.

13.4.1 Upon termination of this Agreement, either in its entirety or with respect to one or more applicable countries (each, a "Terminated Country") pursuant to Section 13.2.1, 13.2.2, 13.2.3 or 13.2.5 hereof (the rights and obligations of the Parties as to the remaining countries of the Territory in which termination under Section 13.2.3 or 13.2.5 has not occurred, being unaffected by such termination), the following shall apply:

a) **[***]**.

b) **[***]**.

c) All amounts due or payable to **[***]** shall remain due and payable.

d) Should Retrophin have **[***]**, Retrophin shall **[***]**.

e) Should Retrophin have **[***]**.

f) Retrophin shall **[***]**.

g) If Retrophin has the **[***]**.

h) Retrophin shall **[***]**.

i) Retrophin shall **[***]**.

j) Retrophin hereby**[***]**.

k) Neither Party shall be relieved of any obligation that accrued prior to the effective date of such termination or expiration.

l) Each Party shall have the right to retain all amounts previously paid to it by the other Party, subject to any applicable determination of an arbitrator or court pursuant to Article 14.

m) It is understood and agreed that Ligand shall be entitled to **[***]** as a remedy to enforce the provisions of this Section 13.4, in addition to any other remedy to which it may be entitled by applicable Law.

13.5 Termination by BMS.

13.5.1 Any rights granted by Ligand pursuant to this Agreement shall terminate on a country-by-country and Licensed Product-by-Licensed Product basis effective upon termination under Section 13.2 of the Upstream License Agreement with respect to such sublicensed rights; *provided, however,* that such sublicensed rights shall not

terminate if, as of the effective date of such termination by BMS under Section 13.2 of the Upstream License Agreement, Retrophin is not in material breach of its obligations to Ligand under this Agreement, and within sixty (60) days of such termination Retrophin agrees in writing to be bound directly to BMS under a license agreement substantially similar to this Agreement with respect to the rights sublicensed hereunder, substituting Retrophin for Ligand.

13.5.2 BMS may terminate the Upstream License Agreement where (a) Retrophin or its Affiliate (alone or in collaboration with a Third Party) undertakes the clinical development of a product that contains a **[***]** prior to the first U.S. NDA Approval being obtained for a Licensed Compound or (b) Retrophin or its Affiliate (alone or in collaboration with a Third Party) markets a product that contains a **[***]** within **[***]** years following the first U.S. NDA Approval for a Licensed Product.

13.6 Scope of Termination. Except as otherwise expressly provided herein, termination of this Agreement shall be as to all countries in the Territory and all Licensed Compounds and Licensed Products.

(i) Survival. The following provisions shall survive termination or expiration of this Agreement, as well as any other provision which by its terms or by the context thereof, is intended to survive such termination: Article 1 (as applicable), Article 5 (with respect to obligations arising prior to expiration or termination of this Agreement), Article 8 (with respect to obligations arising prior to expiration or termination of this Agreement), Section 9.4, Section 9.5, Section 10.1, 10.4.4 (with respect to an action, suit or proceeding commenced prior to termination), Section 10.7, Article 11, Article 12 (with respect to Losses and Claims arising from activities and breaches that take place prior to expiration or termination of this Agreement), this Section 13.6(i), Section 13.7, Article 14 and Article 15. Termination or expiration of this Agreement shall not relieve the Parties of any liability or obligation which accrued hereunder prior to the effective date of such termination or expiration nor preclude either Party from pursuing all rights and remedies it may have hereunder or at law or in equity, subject to Article 14, with respect to any breach of this Agreement nor prejudice either Party's right to obtain performance of any obligation. All other obligations shall terminate upon expiration of this Agreement.

13.7 Bankruptcy. The Parties agree that in the event a Party becomes a debtor under Title 11 of the U.S. Code ("Title 11"), this Agreement shall be deemed to be, for purposes of Section 365(n) of Title 11, a license to rights to "intellectual property" as defined therein. Each Party as a licensee hereunder shall have the rights and elections as specified in Title 11. Any agreements supplemental hereto shall be deemed to be "agreements supplementary to" this Agreement for purposes of Section 365(n) of Title 11.

ARTICLE 14.

DISPUTE RESOLUTION; ARBITRATION

14.1 Dispute Resolution. The Parties agree that the procedures set forth in this Section 14.1 shall be the exclusive mechanism for resolving any bona fide disputes, controversies or claims (collectively, "Disputes") between the Parties that arise from time to time pursuant to this Agreement relating to any Party's rights and/or obligations hereunder that cannot be resolved through good faith negotiation between the Parties.

14.2 Executive Mediation. Any Dispute shall first be referred to an Executive from each Party for attempted resolution by good faith negotiations. Any such Dispute shall be submitted to such Executives no later than **[***]** days following such request by

either Party. Such Executives shall attempt in good faith to resolve any such Dispute within **[***]** days after submission of the Dispute. In the event the Executives are unable to resolve the Dispute, the Parties shall otherwise negotiate in good faith and use reasonable efforts to settle.

14.3 Arbitration.

14.3.1 If the Parties are not able to fully settle a Dispute pursuant to Section 14.2 above, and a Party wishes to pursue the matter, each such Dispute that is not an Excluded Claim or subject to expedited arbitration in accordance with Section 14.4 below, shall be finally resolved by binding arbitration in accordance with the Commercial Arbitration Rules and Supplementary Procedures for Large Complex Disputes of the American Arbitration Association ("AAA"), and judgment on the arbitration award may be entered in any court having jurisdiction thereof; provided, however, that the Federal Rules of Evidence shall apply with regard to the admissibility of evidence in such hearing.

14.3.2 The arbitration shall be conducted by a panel of three persons experienced in the pre-clinical and clinical stage pharmaceutical business. Within **[***]** days 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 **[***]** days 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 AAA. In any case the arbitrator shall not be an Affiliate, employee, consultant, officer, director or stockholder of either Party, or otherwise have any current or previous relationship with either Party or their respective Affiliates. The Parties shall have the right to be represented by counsel. The place of arbitration shall be New York, NY. All proceedings and communications shall be in English.

14.3.3 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, without waiving any remedy under this Agreement, seek from any court having jurisdiction any injunctive or provisional relief necessary to protect the rights or property of that Party pending the arbitration award. The arbitrators shall have no authority to award punitive or any other type of damages not measured by a Party's compensatory damages. Each Party shall bear its own costs and expenses and attorneys' fees and an equal share of the arbitrators' fees and any administrative fees of arbitration.

14.3.4 Except to the extent necessary to confirm an award or as may be required by Law, neither a Party nor an arbitrator may disclose the existence, content, or results of an arbitration without the prior written consent of both Parties. 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.

14.3.5 The arbitrators shall use their commercially reasonable efforts to rule on each disputed issue within days after completion of the hearing described in Section 14.3. The determination of the arbitrators as to the resolution of any dispute shall be binding and conclusive upon all Parties. All rulings of the arbitrator shall be in writing and shall be delivered to the Parties except to the extent that the Commercial Arbitration Rules of the AAA provide otherwise. Nothing contained herein shall be construed to permit the arbitrator to award punitive, exemplary or any similar damages.

14.3.6 The (i) attorneys' fees of the Parties in any arbitration, (ii) fees of the arbitrator and (iii) costs and expenses of the arbitration shall be borne by the Parties in a proportion determined by the arbitrator.

14.3.7 For all Excluded Claims, the Parties hereby submit to the exclusive jurisdiction of the Supreme Court of the State of New York, New York County and the United States District Court for the Southern District of New York. For clarity, each party may seek injunctive or other equitable relief for Excluded Claims in accordance with this Section 14.3.7. Each Party agrees that service of any process, summons, notice or document by personal delivery, by registered mail, or by a recognized international express delivery service to such Party's respective address set forth in Section 15.2 shall be effective service of process for any action, suit or proceeding in the district court or state court with respect to any matters to which it has submitted to jurisdiction in this Section 14.3.7. Each Party irrevocably and unconditionally waives any objection to the laying of venue of any action, suit or proceeding arising out of this Agreement or the transactions contemplated hereby in the district court or state court, and hereby and thereby further irrevocably and unconditionally waives and agrees not to plead or claim in any such court that any such action, suit or proceeding brought in any such court has been brought in an inconvenient forum. Each Party hereto also hereby waives to the fullest extent permitted by applicable Laws, any right it may have to a trial by jury in respect to any litigation directly or indirectly arising out of, under or in connection with this Agreement. Each Party hereto (i) certifies that no representative, agent or attorney of the other Party has represented, expressly or otherwise, that such other Party would not, in the event of litigation, seek to enforce that foregoing waiver and (ii) acknowledges that it and the other Party hereto have been induced to enter into this Agreement, as applicable, by, among other things, the mutual waivers and certifications in this Section 14.3.7.

14.4 Expedited Arbitration. The Parties agree that it is important to be able to clarify any disputes regarding **[***]** quickly. Accordingly, if: (i) Ligand **[***]**; (ii) **[***]**; or (iii) **[***]**; then the Parties shall resolve such dispute in accordance with this Section 14.4. Arbitration under this Section 14.4 shall be conducted in the same manner and subject to the same terms and conditions as arbitration under Section 14.3, provided that: (i) the Parties shall designate in writing a single arbitrator within fifteen (15) days of written notice of the dispute; (ii) the arbitrator and the Parties shall meet, and each Party shall provide to the arbitrator a written summary of all disputed issues, such Party's position on such disputed issues and such Party's proposed ruling on the merits of each such issue within fifteen (15) days after the designation of the arbitrator; (iii) the arbitrator shall use his or her commercially reasonable efforts to rule on each disputed issue within fifteen (15) days after completion of the hearing described in Section 14.3; (d) the arbitrator shall select one of the requested positions as his decision, and shall not have the authority to render any substantive decision other than to so select the position of either Ligand or Retrophin; and (e) the Parties shall use good faith efforts to complete any expedited arbitration pursuant to this Section 14.4 promptly.

ARTICLE 15.

MISCELLANEOUS

15.1 Severability. If any one or more of the provisions of this Agreement is held to be invalid or unenforceable, the provision shall be considered severed from this Agreement and shall not serve to invalidate any remaining provisions hereof. The Parties shall make a good faith effort to replace any invalid or unenforceable provision with a

valid and enforceable one such that the objectives contemplated by the Parties when entering this Agreement may be realized.

15.2 Notices. Any notice required or permitted to be given by this Agreement shall be in writing and shall be delivered by hand or overnight courier with tracking capabilities or mailed postage prepaid by first class, registered or certified mail addressed as set forth below unless changed by notice so given:

If to Ligand:

Ligand Pharmaceuticals Incorporated
11085 North Torrey Pines Road, Suite 300
La Jolla, CA 92037
Attention: General Counsel

With a copy to (which shall not constitute notice hereunder):

Latham & Watkins LLP
12636 High Bluff Drive, Suite 400
San Diego, CA 92130
Attention: Faye H. Russell, Esq.

If to Retrophin:

Retrophin LLC
330 Madison Avenue, 6th Floor
New York, NY 10017
Attention: Martin Shkreli

With a copy to (which shall not constitute notice hereunder):

Katten Muchin Rosenman LLP
575 Madison Avenue
New York, NY 10022
Attention: Evan L. Greebel, Esq.

Any such notice shall be deemed given on the date received. A Party may add, delete, or change the person or address to whom notices should be sent at any time upon written notice delivered to the Party's notices in accordance with this Section 15.2.

15.3 Force Majeure. Neither Party shall be liable for delay or failure in the performance of any of its obligations hereunder (including, without limitation Sections 6.1.2 and 6.1.3 of this Agreement) if such delay or failure is due to causes beyond its reasonable control, including acts of God, fires, earthquakes, strikes and labor disputes, acts of war, terrorism, civil unrest or intervention of any governmental authority ("Force Majeure"); *provided*, *however*, that the affected Party promptly notifies the other Party and further provided that the affected Party shall use its commercially reasonable efforts to avoid or remove such causes of non-performance and to mitigate the effect of such occurrence and shall continue performance with the utmost dispatch whenever such causes are removed. When such circumstances arise, the Parties shall negotiate in good faith any

modifications of the terms of this Agreement that may be necessary or appropriate in order to arrive at an equitable solution.

15.4 Assignment.

15.4.1 Ligand may, without Retrophin's consent, assign or transfer all of its rights and obligations hereunder, in connection with any transfer of all of the Patent Rights and Know-How, to any Affiliate of Ligand or to any Third Party (including a successor in interest); *provided*, *however*, that such assignee or transferee agrees in writing to be bound by the terms of this Agreement.

15.4.2 Retrophin may assign or transfer all of its rights and obligations hereunder without consent to an Affiliate of Retrophin or to a successor in interest by reason of merger, consolidation or sale of all or substantially all of the assets of Retrophin; *provided however*, that (i) Retrophin's rights and obligations under this Agreement shall be assumed by its successor in interest and shall not be transferred separate from all or substantially all of its other business assets, (ii) such assignment includes all Approvals and all rights and obligations under this Agreement, (iii) such successor in interest or Affiliate shall have agreed prior to such assignment or transfer to be bound by the terms of this Agreement in writing and (iv) where this Agreement is assigned or transferred to an Affiliate, Retrophin remains responsible for the performance of this Agreement.

15.4.3 Subject to the foregoing, this Agreement shall inure to the benefit of and be binding on the Parties' successors and assigns. Any assignment or transfer in violation of the foregoing shall be null and void and wholly invalid, the assignee or transferee in any such assignment or transfer shall acquire no rights whatsoever, and the non-assigning non-transferring Party shall not recognize, nor shall it be required to recognize, such assignment or transfer.

15.5 Further Assurances. Each Party agrees to do and perform all such further acts and things and shall execute and deliver such other agreements, certificates, instruments and documents necessary or that the other Party may deem advisable in order to carry out the intent and accomplish the purposes of this Agreement and to evidence, perfect or otherwise confirm its rights hereunder.

15.6 Waivers and Modifications. The failure of any Party to insist on the performance of any obligation hereunder shall not be deemed to be a waiver of such obligation. Waiver of any breach of any provision hereof shall not be deemed to be a waiver of any other breach of such provision or any other provision on such occasion or any succeeding occasion. No waiver, modification, release or amendment of any obligation under or provision of this Agreement shall be valid or effective unless in writing and signed by all Parties hereto.

15.7 Choice of Law. This Agreement shall be governed by, enforced, and shall be construed in accordance with the laws of the State of New York without regard to its conflicts of law provisions.

15.8 Publicity. The Parties agree to issue a press release regarding the execution of this Agreement, in a form to be mutually agreed upon by the Parties. Subject to the provisions of Sections 11.2, 11.4 and 11.5, each Party agrees not to issue any other press release or public statement disclosing the existence of this Agreement or any other information relating to this Agreement, the other Party, or the transactions contemplated

hereby without the prior written consent of the other Party; *provided*, *however*, that any disclosure which is required by applicable Laws or the rules of a securities exchange, as reasonably advised by the disclosing Party's counsel, may be made subject to the following. The Parties agree that any such required disclosure will not contain confidential business or technical information and, if disclosure of confidential business or technical information is required by applicable Laws, the Parties will use appropriate diligent efforts to minimize such disclosure and obtain confidential treatment for any such information which is disclosed to a governmental agency. Each Party agrees to provide to the other Party a copy of any public announcement regarding this Agreement or the subject matter thereof as soon as reasonably practicable under the circumstances prior to its scheduled release. Except under extraordinary circumstances, or as otherwise required under applicable Laws or the rules of a securities exchange, each Party shall provide the other with an advance copy of any such announcement at least forty eight (48) hours prior to its scheduled release. Each Party shall have the right to expeditiously review and recommend changes to any such announcement and, except as otherwise required by applicable Laws or the rules of a securities exchange, the Party whose announcement has been reviewed shall remove any Confidential Information of the reviewing Party that the reviewing Party reasonably deems to be inappropriate for disclosure. The contents of any announcement or similar publicity which has been reviewed and approved by the reviewing Party can be re-released by either Party without a requirement for re-approval. Nothing in this Section 15.8 shall be construed to prohibit Retrophin or its Affiliates or Sublicensees from making a public announcement or disclosure regarding the stage of development of Licensed Products in Retrophin's (or its Affiliates' or Sublicensees') product pipeline or disclosing clinical trial results regarding such Licensed Products, as may be required by applicable Laws or the rules of a securities exchange, as reasonably advised by Retrophin's (or its Affiliates' or Sublicensees') counsel.

15.9 Relationship of the Parties. Each Party is an independent contractor under this Agreement. Nothing contained herein is intended or is to be construed so as to constitute Ligand and Retrophin as partners, agents or joint venturers. Neither Party shall have any express or implied right or authority to assume or create any obligations on behalf of or in the name of the other Party or to bind the other Party to any contract, agreement or undertaking with any Third Party.

15.10 Headings. Headings and captions are for convenience only and are not be used in the interpretation of this Agreement.

15.11 Entire Agreement. This Agreement (including all Appendices attached hereto, which are incorporated herein by reference) (i) sets forth all of the covenants, promises, agreements, warranties, representations, conditions and understandings between the Parties hereto, (ii) constitutes and contains the complete, final and exclusive understanding and agreement of the Parties with respect to the subject matter herein and (iii) cancels, supersedes and terminates all prior agreements and understanding between the Parties with respect to the subject matter hereof. For the avoidance of doubt, the confidentiality agreement entered into by Ligand and Retrophin effective as of December 11, 2011 (the "Confidentiality Agreement") shall remain in effect with respect to all Confidential Information (as that term is defined in the Confidentiality Agreement) disclosed by the Parties that does not pertain to the subject matter of this Agreement. All Confidential Information (as that term is defined in the Confidentiality Agreement) pertaining to the subject matter of this Agreement disclosed to Ligand by Retrophin under the Confidentiality Agreement shall be considered Confidential Information (as that term is defined in this Agreement) of Retrophin disclosed under this Agreement and shall be

subject to the terms and conditions of this Agreement; and all Confidential Information (as that term is defined in the Confidentiality Agreement) pertaining to the subject matter of this Agreement disclosed to Retrophin by Ligand under the Confidentiality Agreement shall be considered Confidential Information (as that term is defined in this Agreement) of Ligand disclosed under this Agreement and shall be subject to the terms and conditions of this Agreement. There are no covenants, promises, agreements, warranties, representations, conditions or understandings, whether oral or written, between the Parties other than as set forth herein. No subsequent alteration, amendment, change or addition to this Agreement shall be binding upon the Parties hereto unless reduced to writing and signed by the respective authorized officers of the Parties.

15.12 Counterparts. This Agreement may be executed in counter-parts with the same effect as if both Parties had signed the same document. All such counterparts shall be deemed an original, shall be construed together and shall constitute one and the same instrument.

15.13 Exports. Retrophin agrees not to export or re-export, directly or indirectly, any information, technical data, the direct product of such data, samples or equipment received or generated under this Agreement in violation of any applicable export control Laws.

15.14 Interpretation.

15.14.1 Each of the Parties acknowledges and agrees that this Agreement has been diligently reviewed by and negotiated by and between them, that in such negotiations each of them has been represented by competent counsel and that the final agreement contained herein, including the language whereby it has been expressed, represents the joint efforts of the Parties hereto and their counsel. Accordingly, in interpreting this Agreement or any provision hereof, no presumption shall apply against any Party hereto as being responsible for the wording or drafting of this Agreement or any such provision, and ambiguities, if any, in this Agreement shall not be construed against any Party, irrespective of which Party may be deemed to have authored the ambiguous provision.

15.14.2 The definitions of the terms herein shall apply equally to the singular and plural forms of the terms defined. Whenever the context may require, any pronoun shall include the corresponding masculine, feminine and neuter forms. The words “include,” “includes” and “including” shall be deemed to be followed by the phrase “without limitation.” The word “will” shall be construed to have the same meaning and effect as the word “shall.” The word “any” shall mean “any and all” unless otherwise clearly indicated by context.

15.14.3 Unless the context requires otherwise, (a) any definition of or reference to any agreement, instrument or other document herein shall be construed as referring to such agreement, instrument or other document as from time to time amended, supplemented or otherwise modified (subject to any restrictions on such amendments, supplements or modifications set forth herein or therein), (b) any reference to any Laws herein shall be construed as referring to such Laws as from time to time enacted, repealed or amended, (c) any reference herein to any person shall be construed to include the person’s successors and assigns, (d) the words “herein”, “hereof” and “hereunder”, and words of similar import, shall be construed to refer to this Agreement in its entirety and not to any particular provision hereof, and (e) all references herein to Articles, Sections

or Appendices, unless otherwise specifically provided, shall be construed to refer to Articles, Sections and Appendices of this Agreement.

* * *

[signature page follows]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective duly authorized officers as of the date first set forth above.

LIGAND PHARMACEUTICALS RETROPHIN, LLC
INCORPORATED
("Ligand") ("Retrophin")

By: /s/ Charles Berkman By: /s/ Martin Shkreli

Name: Charles Berkman Name: Martin Shkreli

Title: Vice President, General Counsel and Secretary Title: Chief Executive Officer

Appendix 1

Core Patent Rights

[***]	[***]	[***]	[***]	[***]	[***]	[***]	[***]	[***]
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Appendix 2

Active Compound

"Active Compound" means a compound that **[***]**.

"**[***]**" means **[***]**.

"**[***]**" means the **[***]**.

Appendix 3

Development Plan

(attached hereto)

[***]

[***]

[***]

[***]

[***]

[***]

[***]

[***] – EIGHT PAGES REDACTED

Appendix 4

Listed Compounds

[***]

AMENDMENT TO

SUBLICENSE AGREEMENT

*****Certain information (indicated by asterisks) has been omitted from this document because it is not material and would likely cause competitive harm to the registrant if publicly disclosed.**

THIS AMENDMENT TO SUBLICENSE AGREEMENT (the "**Amendment**") is made and entered into as of December 11, 2012 (**"Amendment Effective Date"**) and amends the Sublicense Agreement effective as of February 16, 2012 (the **"Sublicense Agreement"**) by and between Ligand Pharmaceuticals Incorporated, a corporation organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 and its wholly owned subsidiary, Pharmacopeia, LLC (as successor in interest to Pharmacopeia Drug Discovery Inc.) (**"PCOP"**), a limited liability company organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 (collectively, Ligand Pharmaceuticals Incorporated and PCOP shall be known as **"Ligand"**) and Retrophin, Inc., a corporation organized under the laws of Delaware and having a place of business at 777 Third Avenue, 22nd Floor, New York, NY, 10017 (**"Retrophin"**).

WHEREAS, Ligand and Retrophin have previously entered into the Sublicense Agreement; and

WHEREAS, Ligand and Retrophin desire to amend certain terms of the Sublicense Agreement as set forth herein.

NOW THEREFORE, in consideration of the foregoing premises and the mutual covenants contained herein, the Parties, intending to be legally bound, agree as follows:

1. **Capitalized Terms**. The capitalized terms used herein and not otherwise defined shall have the same definitions as provided in the Sublicense Agreement.

2. **Amendments**.

(a) **Development Milestone Payments**. Table 1 of Section 8.2.1 of the Agreement is hereby amended in its entirety as follows:

"Table 1

Milestone Event	Milestone Payment
Execution of Agreement	$1.15 million
The earlier of (a) December 31, 2012 or (b) initiation of the first Phase 2 Trial for a Licensed Product	$1.15 million (the **"Second Milestone"**); provided, that if the Second Milestone is received by Ligand prior to December 31, 2012, Retrophin shall make an additional $150,000 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.3 million) (the $150,000 additional payment, an **"Additional Payment"**)[1]
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1) If the Second Milestone and any Additional Payment is not received by Ligand on or before December 31, 2012, Ligand shall have the right to terminate the Agreement pursuant to Section 13.2.2 with immediate effect as of December 31, 2012 by providing written notice to Retrophin, notwithstanding (a) the cure period for the failure to make a payment when due set out in said Section 13.2.2 (Breach) or (b) the provisions of Section 13.2.4 (Disputed Breach). In addition, and for clarity, the provisions of Section 13.4 (Effect of Termination) shall be operative, including, without limitation, the provisions of subsections (c), (k) and (m) related to amounts then due and payable. "

(b) **Exit Transaction Milestone**. Section 8.2.2 of the Agreement is amended by replacing [***] with [***].

(c) **Expedited Arbitration**. Section 14.4 of the Agreement is hereby amended in its entirety as follows:

"The Parties agree that it is important to be able to clarify any disputes regarding [***] quickly. Accordingly, if: (i) Ligand [***]; (ii) [***]; (iii) [***]; or (iv) [***]; then the Parties shall resolve such dispute in accordance with this Section 14.4. Arbitration under this Section 14.4 shall be conducted in the same manner

and subject to the same terms and conditions as arbitration under Section 14.3, provided that: (i) the Parties shall designate in writing a single arbitrator within fifteen (15) days of written notice of the dispute; (ii) the arbitrator and the Parties shall meet, and each Party shall provide to the arbitrator a written summary of all disputed issues, such Party's position on such disputed issues and such Party's proposed ruling on the merits of each such issue within fifteen (15) days after the designation of the arbitrator; (iii) the arbitrator shall use his or her commercially reasonable efforts to rule on each disputed issue within fifteen (15) days after completion of the hearing described in Section 14.3; (iv) the arbitrator shall select one of the requested positions as his decision, and shall not have the authority to render any substantive decision other than to so select the position of either Ligand or Retrophin; and (v) the Parties shall use good faith efforts to complete any expedited arbitration pursuant to this Section 14.4 promptly."

*****Certain information (indicated by asterisks) has been omitted from this document because it is not material and would likely cause competitive harm to the registrant if publicly disclosed.**

3. **No Other Amendments**. Except as provided herein, the Sublicense Agreement shall continue in full force and effect.

4. **Release**.

(a) As used in this Clause, "Related Persons and Entities" in connection with a Party means any and all past, present, and future parents, subsidiaries, affiliates, partners, owners, joint venturers, stockholders, predecessors, successors, officers, members, directors, administrators, employees, agents, representatives, consultants, attorneys, insurers, heirs, executors, assignors or assignees, retirement plans (and/or their trustees) of that Party and any other person, firm, or corporation with whom that Party is now or may hereinafter be affiliated, and any of them.

(b) Retrophin and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party hereby fully and forever, knowingly, voluntarily, and irrevocably release, acquit, discharge, and promises not to sue Ligand and its Related Persons and Entities, from, without limitation, any and all claims, demands, damages, obligations, losses, causes of action, costs, expenses, attorneys' fees, judgments, liabilities, duties, debts, liens, accounts, obligations, contracts/agreements, promises, representations, actions, and causes of action, other proceedings and indemnities of any nature whatsoever arising from or in any way related to: (i) the quality of the medication; or (ii) compliance of the medication with specifications of Governmental Authorities delivered pursuant to the Sublicense Agreement; or (iii) Ligand's conduct during diligence and negotiations leading to the Sublicense Agreement, whether accrued or contingent, secured or unsecured, negligent or intentional, known or unknown, suspected or unsuspected, and whether based on law, equity, contract, tort, statute, or other legal or equitable theory of recovery, whether mature or to mature in the future, which from the beginning of time to the date of this Amendment, Retrophin and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party had, now have, or claims to have against Ligand and its Related Persons and Entities, or any other person or entity described above.

(c) Retrophin acknowledges that it may later discover material facts in addition to, or different from, those which it now knows or believes to be true. Retrophin further acknowledges that there may be future events, circumstances or occurrences materially different from those it knows or believes likely to occur. It is the intention of Retrophin to fully, finally and forever settle and generally release all claims, disputes and differences described above occurring prior to the date hereof.

The releases provided in this Amendment shall remain in full effect notwithstanding the discovery or existence of any such additional or different facts or occurrence of any such future events, circumstances or conditions.

(d) Retrophin and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party hereby expressly waive the benefit of any statute or rule of law that, if applied to this Amendment would otherwise exclude from its binding effect any claims described above not known by it to exist which arose prior to the signing of this Amendment. Retrophin acknowledges that it has read and fully understands the provisions of California Civil Code section 1542, which provides as follows:

A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH, IF KNOWN BY HIM MUST HAVE MATERIALLY AFFECTED HIS SETTLEMENT WITH THE DEBTOR.

Retrophin, being aware of said Code Section, hereby expressly waives, on behalf of itself and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party, any rights and benefits that they may have under section 1542 of the California Civil Code to the full extent that they may lawfully waive such rights and benefits, and shall waive any rights and benefits they may have under any other statutes or common law principles of similar effect.

(e) This Amendment and its terms, including, but not limited to, the Release set forth in this Section 4, and the execution of this Amendment, shall not be construed as an admission of liability or fault by either of the Parties.

5. **Governing Law**. This Amendment shall be governed by, enforced, and shall be construed in accordance with the laws of the State of New York without regard to its conflicts of law provisions.

6. **Counterparts**. This Amendment may be executed in counter-parts with the same effect as if both Parties had signed the same document. All such counterparts shall be deemed an original, shall be construed together and shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have executed this Amendment to Sublicense Agreement through their duly authorized representatives to be effective as of the Amendment Effective Date.

LIGAND PHARMACEUTICALS INCORPORATED

By: /s/ Matthew Foehr

Title: Vice President, Corporate Development

Date: 12/20/12

RETROPHIN, INC.

By: /s/ Martin Shkreli

Title: Chief Executive Officer

Date: 12/19/2012

AMENDMENT NO. 2 TO

SUBLICENSE AGREEMENT

*****Certain information (indicated by asterisks) has been omitted from this document because it is not material and would likely cause competitive harm to the registrant if publicly disclosed.**

THIS AMENDMENT NO. 2 TO SUBLICENSE AGREEMENT (the "**Amendment**") is made and entered into as of January 7, 2013 (**"Amendment Effective Date"**) and amends the Sublicense Agreement effective as of February 16, 2012, as amended pursuant to that certain Amendment to Sublicense Agreement dated December 11, 2012 (the **"Sublicense Agreement"**) by and between Ligand Pharmaceuticals Incorporated, a corporation organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 and its wholly owned subsidiary, Pharmacopeia, LLC (as successor in interest to Pharmacopeia Drug Discovery Inc.) (**"PCOP"**), a limited liability company organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 (collectively, Ligand Pharmaceuticals Incorporated and PCOP shall be known as **"Ligand"**) and Retrophin, Inc., a corporation organized under the laws of Delaware and having a place of business at 777 Third Avenue, 22nd Floor, New York, NY, 10017 (**"Retrophin"**).

WHEREAS, Ligand and Retrophin have previously entered into the Sublicense Agreement; and

WHEREAS, Ligand and Retrophin desire to amend certain terms of the Sublicense Agreement as set forth herein.

NOW THEREFORE, in consideration of the foregoing premises and the mutual covenants contained herein, the Parties, intending to be legally bound, agree as follows:

1. **Capitalized Terms**. The capitalized terms used herein and not otherwise defined shall have the same definitions as provided in the Sublicense Agreement.

2. **Amendments**.

Development Milestone Payments. Table 1 of Section 8.2.1 of the Agreement is hereby amended in its entirety as follows:

"Table 1

Milestone Event	Milestone Payment
Execution of Agreement	$1.15 million
The earlier of (a) March 31, 2013 or (b) initiation of the first Phase 2 Trial for a Licensed Product	$1.3 million (the **"Second Milestone"**); provided, that if the Second Milestone is received by Ligand (a) prior to or on January 31, 2013, Retrophin shall make an additional $50,000 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.2 million), (b) after January 31, 2013 but prior to or on February 28, 2013, Retrophin shall make an additional $100,000 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.4 million), and (c) after February 28, 2013 but prior to or on March 31, 2013, Retrophin shall make an additional $150,000 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.45 million) (the additional payment, an **"Additional Payment"**)[1]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]

1) If the Second Milestone and any Additional Payment is not received by Ligand on or before March 31, 2013, Ligand shall have the right to terminate the Agreement pursuant to Section 13.2.2 with immediate effect as of March 31, 2013 by providing written notice to Retrophin, notwithstanding (a) the cure period for the failure to make a payment when due set out in said Section 13.2.2 (Breach) or (b) the provisions of Section 13.2.4 (Disputed Breach). In addition, and for clarity, the provisions of Section 13.4 (Effect of Termination) shall be operative, including, without limitation, the provisions of subsections (c), (k) and (m) related to amounts then due and payable."

3. **No Other Amendments**. Except as provided herein, the Sublicense Agreement shall continue in full force and effect.

***Certain information (indicated by asterisks) has been omitted from this document because it is not material and would likely cause competitive harm to the registrant if publicly disclosed.

4. **Release**.

(a) As used in this Clause, "Related Persons and Entities" in connection with a Party means any and all past, present, and future parents, subsidiaries, affiliates, partners, owners, joint venturers, stockholders, predecessors, successors, officers, members, directors, administrators, employees, agents, representatives, consultants, attorneys, insurers, heirs, executors, assignors or assignees, retirement plans (and/or their trustees) of that Party and any other person, firm, or corporation with whom that Party is now or may hereinafter be affiliated, and any of them.

(b) Retrophin and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party hereby fully and forever, knowingly, voluntarily, and irrevocably release, acquit, discharge, and promises not to sue Ligand and its Related Persons and Entities, from, without limitation, any and all claims, demands, damages, obligations, losses, causes of action, costs, expenses, attorneys' fees, judgments, liabilities, duties, debts, liens, accounts, obligations, contracts/agreements, promises, representations, actions, and causes of action, other proceedings and indemnities of any nature whatsoever arising from or in any way related to the Sublicense Agreement, as amended pursuant to this Amendment, whether accrued or contingent, secured or unsecured, negligent or intentional, known or unknown, suspected or unsuspected, and whether based on law, equity, contract, tort, statute, or other legal or equitable theory of recovery, whether mature or to mature in the future, which from the beginning of time to the date of this Amendment, Retrophin and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party had, now have, or claims to have against Ligand and its Related Persons and Entities, or any other person or entity described above.

(c) Retrophin acknowledges that it may later discover material facts in addition to, or different from, those which it now knows or believes to be true. Retrophin further acknowledges that there may be future events, circumstances or occurrences materially different from those it knows or believes likely to occur. It is the intention of Retrophin to fully, finally and forever settle and generally release all claims, disputes and differences described above occurring prior to the date hereof. The releases provided in this Amendment shall remain in full effect notwithstanding the discovery or existence of any such additional or different facts or occurrence of any such future events, circumstances or conditions.

(d) Retrophin and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party hereby expressly waive the benefit of any statute or rule of law that, if applied to this Amendment would otherwise exclude from its binding effect any claims described above not known by it to exist which arose prior to the signing of this Amendment. Retrophin acknowledges that it has read and fully understands the provisions of California Civil Code section 1542, which provides as follows:

A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH, IF KNOWN BY HIM MUST HAVE MATERIALLY AFFECTED HIS SETTLEMENT WITH THE DEBTOR.

Retrophin, being aware of said Code Section, hereby expressly waives, on behalf of itself and its Affiliates and any and all officers, directors, owners, predecessors, or successors, of that Party, any rights and benefits that they may have under section 1542 of the California Civil Code to the full extent that they may lawfully waive such rights and benefits, and shall waive any rights and benefits they may have under any other statutes or common law principles of similar effect.

(e) This Amendment and its terms, including, but not limited to, the Release set forth in this Section 4, and the execution of this Amendment, shall not be construed as an admission of liability or fault by either of the Parties.

5. **Governing Law**. This Amendment shall be governed by, enforced, and shall be construed in accordance with the laws of the State of New York without regard to its conflicts of law provisions.

6. **Counterparts**. This Amendment may be executed in counter-parts with the same effect as if both Parties had signed the same document. All such counterparts shall be deemed an original, shall be construed together and shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have executed this Amendment to Sublicense Agreement through their duly authorized representatives to be effective as of the Amendment Effective Date.

LIGAND PHARMACEUTICALS INCORPORATED

By: /s/ Charles Berkman

Name: Charles Berkman

Title: Vice President, General Counsel and Secretary

Date: January 7, 2013

RETROPHIN, INC.

By: /s/ Martin Shkreli

Name: Martin Shkreli

Title: Chief Executive Officer

Date: January 7, 2013

AMENDMENT NO. 3 TO SUBLICENSE AGREEMENT

[***] Certain information (indicated by asterisks) has been omitted from this document because it is not material and would likely cause competitive harm to the registrant if publicly disclosed.

THIS AMENDMENT NO. 3 TO SUBLICENSE AGREEMENT (the "**Amendment**") is made and entered into as of February 27, 2015 ("**Amendment Effective Date**") and amends the Sublicense Agreement effective as of February 16, 2012, as amended pursuant to that certain Amendment to Sublicense Agreement dated December 11, 2012 and Amendment to Sublicense Agreement dated January 7, 2013 (the "**Sublicense Agreement**") by and between Ligand Pharmaceuticals Incorporated, a corporation organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 and its wholly owned subsidiary, Pharmacopeia, LLC (as successor in interest to Pharmacopeia Drug Discovery Inc.) ("**PCOP**"), a limited liability company organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 (collectively, Ligand Pharmaceuticals Incorporated and PCOP shall be known as "**Ligand**") and Retrophin, Inc., a corporation organized under the laws of Delaware and having a place of business at 777 Third Avenue, 22nd Floor, New York, NY, 10017 ("**Retrophin**").

BACKGROUND

WHEREAS Ligand and Retrophin have previously entered into the Sublicense Agreement; and

WHEREAS, Ligand and Retrophin desire to amend certain terms of the Sublicense Agreement as set forth herein.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants contained herein, the Parties, intending to be legally bound, agree as follows:

1. **Capitalized Terms**. The capitalized terms used herein and not otherwise defined shall have the same definitions as provided in the Sublicense Agreement

2. **Amendments**.

a) Sections 6.1.2 and 6.1.4 of the Sublicense Agreement are hereby removed.

b) Section 6.1.3 of the Sublicense Agreement is hereby amended to read as follows:

"File for Approval for at least one (1) Orphan Licensed Product ("**Approval Submission**") no later than [***] ("**Filing Deadline**"); provided that if Retrophin exercises its Extension Option (as defined below), then the Filing Deadline shall become (a) [***] if the Approval Submission is filed pursuant to the Code of Federal Regulations Title 21, Subpart H ("**Subpart H**") or (b) [***], if the Approval Submission is not eligible to be filed pursuant to Subpart H. In order to exercise the Extension Option, prior to or on [***] ("**Extension Date**"), Retrophin shall either (a) pay to Ligand [***] or (b) issue to Ligand, or ensure that Ligand receives, that number of shares of capital stock of Retrophin equal to [***] as determined by the average of the closing prices for such capital stock over a five (5) trading day period ending three (3) trading days before the Extension Date ("**Extension Option**").

c) **Development Milestone Events**. The third milestone event in Table 1 for $[***] shall be amended and restated as follows:

"[***]"

3. No Other Amendments. Except as provided herein, the Sublicense Agreement shall continue in full force and effect.

4. Governing Law. This Amendment shall be governed by, enforced, and shall be construed in accordance with the laws of the State of New York without regard to its conflicts of law provisions.

5. Counterparts. This Amendment may be executed in counter-parts with the same effect as if both Parties had signed the same document. All such counterparts shall be deemed an original, shall be construed together and shall constitute one and the same instrument.

[*Signature Page Follows*]

IN WITNESS WHEREOF, the Parties have executed this Amendment to Sublicense Agreement through their duly authorized representatives to be effective as of the Amendment Effective Date.

LIGAND PHARMACEUTICALS RETROPHIN, INC.
INCORPORATED

By: /s/ Matthew W. Foehr By: /s/ Steve Aselage

Name: Matthew W. Foehr Name: Steve Aselage
Title: President/COO Title: CEO

AMENDMENT NO. 4 TO SUBLICENSE AGREEMENT

THIS AMENDMENT NO. 4 TO SUBLICENSE AGREEMENT (the "**Amendment**") is made and entered into as of September 17, 2015 ("**Amendment Effective Date**") and amends the Sublicense Agreement effective as of February 16, 2012, as amended pursuant to that certain Amendment to Sublicense Agreement dated December 11, 2012, Amendment No. 2 to Sublicense Agreement dated January 7, 2013, and Amendment No. 3 to Sublicense Agreement dated February 27, 2015 (the "**Sublicense Agreement**") by and between Ligand Pharmaceuticals Incorporated, a corporation organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 and its wholly owned subsidiary, Pharmacopeia, LLC (as successor in interest to Pharmacopeia Drug Discovery Inc.) ("**PCOP**"), a limited liability company organized under the laws of Delaware and having a place of business at 11119 North Torrey Pines Road, Suite 200, La Jolla, CA, 92037 (collectively, Ligand Pharmaceuticals Incorporated and PCOP shall be known as "**Ligand**") and Retrophin, Inc., a corporation organized under the laws of Delaware and having a place of business at 12255 El Camino Real, San Diego, CA 92130 ("**Retrophin**").

BACKGROUND

WHEREAS Ligand and Retrophin have previously entered into the Sublicense Agreement pursuant to which Ligand sublicensed to Retrophin rights under the License Agreement dated March 27, 2006 between PCOP and Bristol-Myers Squib Company (the "Upstream License"); and

WHEREAS, Ligand and Retrophin desire to amend certain terms of the Sublicense Agreement and the Upstream Agreement as set forth herein.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants contained herein, the Parties, intending to be legally bound, agree as follows:

1. Capitalized Terms. The capitalized terms used herein and not otherwise defined shall have the same definitions as provided in the Sublicense Agreement

2. Amendments to Milestone Payments.

a) **Development Milestone Payments**. Table 1 of Section 8.2.1 of the Agreement is hereby amended in its entirety as follows:

(a) Milestone Event	(b) Milestone Payment
(c) Execution of Agreement	(d) $1.15 million
(e) The earlier of (a) December 31, 2012 or (b) initiation of the first Phase 2 Trial for a Licensed Product	(f) $1.3 million (the **"Second Milestone"**); provided, that if the Second Milestone is received by Ligand (a) prior to or on January 31, 2012, Retrophin shall make an additional $50,000 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.35 million), (b) after January 31, 2013 but prior to or on February 28, 2013, Retrophin shall make an additional $100,00 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.4 million), and (c) after February 28, 2013 but prior to or on March 31, 2013, Retrophin shall make an additional $150,000 payment of the Second Milestone (for an aggregate payment of $1.45 million) (the additional payment, an "**Additional Payment"**)[1]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]

[1] If the Second Milestone and any Additional Payment is not received by Ligand on or before March 31, 2013, Ligand shall have the right to terminate the Agreement pursuant to Section 13.2.2 with immediate effect as of March 31, 2013 by providing written notice to Retrophin, notwithstanding (a) the cure period for the failure to make a payment when due set out in said Section 13.2.2 (Breach) or (b) the provisions of Section 13.2.4 (Disputed Breach). In addition, and for clarity, the provisions of Section 13.4 (Effect of Termination) shall be operative, including, without limitation, the provisions of subsections (c),(k), and (m) related to amounts then due and payable."

b) Section 8.10 of the Sublicense Agreement is hereby deleted in its entirety.

3. Consideration. Retrophin shall pay Ligand (i) $850,000 in consideration for the amendments set forth in this Amendment, and (ii) $150,000 for the efforts to amend the Upstream License Agreement in accordance with Section 4 of this Amendment, in each case such payment shall be non-refundable and shall be made within 5 days of execution of this Amendment by both parties.

4. Efforts to Amend Upstream License Agreement.

(a) Ligand will use reasonable best efforts to obtain a waiver of Sections 3.1 and 13.2.5 by BMS for the Asia Pacific Region. "Asia Pacific Region" means Japan, China, S. Korea, Taiwan, Thailand and Vietnam.

(b) Ligand will use reasonable best efforts to obtain BMS' agreement to the standby license provided by Section 2.2.2(v) in which event, Section 2.2.2(v) would be amended substantially in the form of the following language:

"…provided, that, that such sublicensed rights shall not terminate if, as of the effective date of termination by BMS under Section 13.2, the Sublicensee is not in material default under its license agreement with Ligand in which case Sublicensee will assume all of Ligand's rights and obligation under this Sublicense Agreement and be bound directly to BMS substituting Sublicensee for Ligand and subject to the payment to Ligand of all royalties and milestones under the sublicense agreement to the extent they exceed payments due to BMS under this Sublicense Agreement and payment to BMS of all royalties and milestones under this Upstream Agreement."

(c) Ligand will use reasonable best efforts to obtain BMS's agreement to the following amendments to the termination provisions of the Upstream Agreement.

i. Section 13.4 (b) of the Upstream Agreement amended to read as set forth below:

"[***]"

ii. Section 13.4(f) amended as set forth below:

"Ligand will [***]."

iii. Section 13.4(i) deleted.

(d) For the avoidance of doubt, any such efforts by Ligand made under this Sublicense Agreement shall not require Ligand to pay BMS any fee or concede and existing rights, but rather shall solely involve the use of logic and reason to seek to persuade BMS.

5. Amendments to Sublicense Agreement.

a) For the avoidance of doubt, none of the following amendments to the Sublicense Agreement are intended to cause a breach of the Upstream Agreement and any amendment that would otherwise cause such a breach shall be null and void ab initio.

b) Section 1 of the Sublicense Agreement is hereby amended to include the following:

"1.70 "Asia Pacific Region" means Japan, China, S. Korea, Taiwan, Thailand and Vietnam."

c) Section 2.2.2 (vi) is hereby revised as set forth below:

"…provided however, that such sublicensed rights shall not terminate if, as of the effective date of termination by Ligand under Article 13, the Sublicensee is not in material default under its license agreement with Retrophin in which case Sublicensee will assume all of Retrophin's rights and obligation under this Sublicense Agreement and be bound directly to Ligand respectively substituting Sublicensee for Retrophin and subject to the payment to Retrophin of all royalties and milestones under the sublicense agreement to the extent they exceed payments due to Ligand under this Sublicense Agreement and payment to Ligand of all royalties and milestones under this Sublicense Agreement to the extent they exceed payments due to BMS under the Upstream Agreement."

d) Section 3.2 of the Sublicense Agreement is hereby amended to include the following:

"3.2.4 The provisions of Sections 3.2.1 and 3.2.2 shall not apply within the Asia Pacific Region."

e) Section 13.1.1 is hereby amended to add at the beginning of the first sentence "Subject to Section 13.7…"

f) Section 13.2.6 is hereby deleted.

g) Section 13.3 is hereby amended to add prior to the first sentence:

"Retrophin may terminate this Agreement for convenience upon [***] ([***]) days prior written notice to Ligand and all of the provisions of Section 13.4 will survive termination of this Agreement pursuant to this Section 13.3."

h) The following amendments will be effective (i) as between Ligand and Retrophin at a time when there is no breach claimed by BMS under the Upstream Agreement, and/or (ii) at any time upon BMS's agreement to amend or waive the applicable sections of the termination provisions in the Upstream Agreement;

a. Section 13.4(b) is hereby amended as set forth below:

"[***]"

b. Section 13.4(f) amended as set forth below:

"Retrophin will [***]."

c. Section 13.4(i) deleted.

6. Further Agreements.

a) Ligand further agrees that it will not, by act or omission, cause the termination of the Upstream Agreement, provided however Ligand may terminate the Upstream Agreement for good cause with Retrophin's prior written consent, not to be unreasonably withheld. Upon receipt by Ligand of any notice of default or any event that could likely lead to termination of the Upstream Agreement, Ligand will promptly notify Retrophin and work with Retrophin to effect cure of the default or concession with BMS.

b) To the extent BMS shall not agree to the amendments proposed in Section 4 above, Ligand will, to the extent it does not cause a default under the Upstream Agreement, work with Retrophin in good faith and without further consideration and without refund of payments made hereunder to achieve the objectives contemplated by this Amendment by making further efforts to seek agreement from BMS.

7. No Other Amendments. Except as provided herein, the Sublicense Agreement shall continue in full force and effect.

8. Governing Law. This Amendment shall be governed by, enforced, and shall be construed in accordance with the laws of the State of New York without regard to its conflicts of law provisions.

9. Counterparts. This Amendment may be executed in counter-parts with the same effect as if both Parties had signed the same document. All such counterparts shall be deemed an original, shall be construed together and shall constitute one and the same instrument.

[*Signature Page Follows*]

IN WITNESS WHEREOF, the Parties have executed this Amendment to Sublicense Agreement through their duly authorized representatives to be effective as of the Amendment Effective Date.

LIGAND PHARMACEUTICALS RETROPHIN, INC.
INCORPORATED

By: /s/ Charles Berkman By: /s/ Laura Clague

Name: Charles Berkman Name: Laura Clague

Title: VP, General Counsel & Secretary Title: Chief Financial Officer

AMENDMENT NO. 5 TO SUBLICENSE AGREEMENT

THIS AMENDMENT NO. 5 TO SUBLICENSE AGREEMENT (the "**Amendment**") is made and entered into as of March 20, 2018 ("**Amendment Effective Date**") and amends the Sublicense Agreement effective as of February 16, 2012, as amended pursuant to that certain Amendment to Sublicense Agreement dated December 11, 2012, Amendment No. 2 to Sublicense Agreement dated January 7, 2013, Amendment No. 3 to Sublicense Agreement dated February 27, 2015 and Amendment No. 4 to Sublicense Agreement dated September 17, 2015 (the "**Sublicense Agreement**") by and between Ligand Pharmaceuticals Incorporated, a corporation organized under the laws of Delaware and having a place of business at **3911 SORRENTO VALLEY BOULEVARD, SUITE 110, SAN DIEGO, CA 92121** and its wholly owned subsidiary, Pharmacopeia, LLC (as successor in interest to Pharmacopeia Drug Discovery Inc.) ("**PCOP**"), a limited liability company organized under the laws of Delaware and having a place of business at **3911 SORRENTO VALLEY BOULEVARD, SUITE 110, SAN DIEGO, CA 92121** (collectively, Ligand Pharmaceuticals Incorporated and PCOP shall be known as "**Ligand**") and Retrophin Inc., a corporation organized under the laws of Delaware and having a place of business AT **3721 VALLEY CENTRE DRIVE, SUITE 200, SAN DIEGO, CA 92130** ("**Retrophin**").

BACKGROUND

WHEREAS Ligand and Retrophin have previously entered into the Sublicense Agreement pursuant to which Ligand sublicensed to Retrophin rights under the License Agreement dated March 27, 2006 between PCOP and Bristol-Myers Squib Company (the "Upstream License"); and

WHEREAS, Ligand and Retrophin desire to amend certain terms of the Sublicense Agreement as set forth herein.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants contained herein, the parties, intending to be legally bound, agree as follows:

1. **Capitalized Terms**. The capitalized terms used herein and not otherwise defined shall have the same definitions as provided in the Sublicense Agreement.

2. **Amendments**.

a) Section 6.1.3 of the Sublicense Agreement is hereby amended to read as follows:

> "6.1.3 File for Approval for at least one (1) Orphan Licensed Product ("**Approval Submission**") no later than [***] ("**Filing Deadline**");

[***].

b) Section 8.2.1 of the Sublicense Agreement is hereby amended to read as follows:

"8.2.1 Development Milestone Payments. Retrophin shall make milestone payments to Ligand upon achievement of each of the milestone events in the amounts set forth below in Table 1. The first milestone payment shall be payable by Retrophin to Ligand within thirty (30) days of execution of the Agreement. Notwithstanding Section 15.4 or any other provision herein, the last milestone payment shall be payable by Retrophin to Ligand upon the Closing of Retrophin's Exit Transaction. Subject to Section 8.2.2, the remainder of the milestone payments set forth below, with the exception of the milestone payment for Initiation of the first Phase 3 Trial for the first Licensed Product, will be payable by Retrophin to Ligand within thirty (30) days of the achievement of the specified milestone event with respect to each Licensed Compound. The milestone for Initiation of the first Phase 3 Trial for the first Licensed Product will be payable by Retrophin to Ligand within ten (10) days of the execution of Amendment No. 5 by both Parties. The milestone payments shall not be refundable or returnable in any event, nor shall they be creditable against royalties or other payments.

Table 1

Milestone Event	Milestone Payment
Execution of Agreement	$1.15 million
The earlier of (a) December 31, 2012 or (b) initiation of the first Phase 2 Trial for a Licensed Product	$1.3 million (the "**Second Milestone**"); provided, that if the Second Milestone is received by Ligand (a) prior to or on January 31, 2012, Retrophin shall make an additional $50,000 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.35 million), (b) after January 31, 2013 but prior to or on February 28, 2013, Retrophin shall make an additional $100,000 payment simultaneously with the payment of the Second Milestone (for an aggregate payment of $1.4 million), and (c) after February 28, 2013 but prior to or on March 31, 2013, Retrophin shall make an additional $150,000 payment of the Second Milestone (for an aggregate payment of $1.45 million) (the additional payment, an "**Additional Payment**")[2]
At or prior to Initiation of the first Phase 3 Trial for the first Licensed Product	$4.6 million
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]

[2]If the Second Milestone and any Additional Payment is not received by Ligand on or before March 31, 2013, Ligand shall have the right to terminate the Agreement pursuant to Section 13.2.2 with immediate effect as of March 31, 2013 by providing written notice to Retrophin, notwithstanding (a) the cure period for the failure to make a payment when due set out in said Section 13.2.2 (Breach) or (b) the provisions to Section 13.2.4 (Disputed Breach). In addition, and for clarity, the provisions of Section 13.4 (Effect of Termination) shall be operative, including, without limitation, the provisions of subsections (c), (k), and (m) related to amounts then due and payable."

In the event that a milestone event is achieved that triggers a development milestone payment as set forth above, if the preceding milestone events have not occurred such that the previous development milestone payments have not been previously paid, all such previous development milestone payments shall become due and payable upon achievement of such milestone event. For example, if a Phase 3 Trial is initiated that triggers a development milestone payment as set forth above without a Phase 2 Trial supporting such Phase 3 Trial being previously initiated (and consequently the applicable initiation of Phase 2 Trial milestone payment has not been previously paid to Ligand), in addition to the milestone payment for the initiation of the Phase 3 Trial, Retrophin shall also pay to Ligand the applicable milestone payment for the initiation of a Phase 2 Trial."

3. **No Other Amendments**. Except as provided herein, the Sublicense Agreement shall continue in full force and effect.

4. **Governing Law**. This Amendment shall be governed by, enforced, and shall be construed in accordance with the laws of the State of New York without regard to its conflicts of law provisions.

5 . **Counterparts**. This Amendment may be executed in counter-parts with the same effect as if both Parties had signed the same document. All such counterparts shall be deemed an original, shall be construed together and shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have executed this Amendment to Sublicense Agreement through their duly authorized representatives to be effective as of the Amendment Effective Date.

LIGAND PHARMACEUTICALS RETROPHIN, INC.

INCORPORATED

By: /s/ Charles S. Berkman By: /s/ Stephen Aselage

Name: Charles S. Berkman Name: Stephen Aselage

Title: Sr. VP, General Counsel & Secretary Title: CEO

Exhibit 21.1

LIGAND PHARMACEUTICALS INCORPORATED
LIST OF SUBSIDIARIES

Name	**Jurisdiction of Incorporation**
Ab Initio Biotherapeutics, Inc.	Delaware
Adjacent Acquisition Co., LLC	Delaware
Glycomed Incorporated	California
Allergan Ligand Retinoid Therapeutics, Inc.	Delaware
Ligand Pharmaceuticals International, Inc.	Delaware
Ligand Biopharmaceuticals Incorporated	Delaware
Ligand JVR, Inc.	Delaware
Ligand Pharmaceuticals UK Limited	United Kingdom
Ligand Pharmaceuticals (Canada) Incorporated	Canada
Seragen Incorporated	Delaware
Seragen Technology, Inc.	Delaware
Pharmacopeia, LLC	Delaware
Metabasis Therapeutics, Inc.	Delaware
Neurogen Corporation	Delaware
CyDex Pharmaceuticals, Inc.	Delaware
Open Monoclonal Technology, Inc.	Delaware
OMT I, Inc.	Delaware
OMT II, Inc.	Delaware
Crystal Bioscience, Inc.	California
Vernalis plc	England and Wales
Vernalis (R&D) Limited	England and Wales
Vernalis Group Limited	England and Wales
Vernalis Therapeutics Inc.	Delaware
Vernalis (Canada) Inc.	Canada
Vernalis (Canada II) Inc.	Canada
Vernalis Development Limited	England and Wales
Vernalis Research Limited	England and Wales
Cita NeuroPharmaceuticals Inc.	Canada

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement (Form S-8 No. 333-233130) pertaining to the 2002 Stock Incentive Plan, as amended and restated of Ligand Pharmaceuticals Incorporated,

(2) Registration Statement (Form S-8 No. 333-212775) pertaining to the 2002 Stock Incentive Plan, as amended and restated of Ligand Pharmaceuticals Incorporated,

(3) Registration Statement (Form S-8 No. 333-182547) pertaining to the 2002 Stock Incentive Plan, as amended and restated of Ligand Pharmaceuticals Incorporated,

(4) Registration Statement (Form S-8 No. 333-160132) pertaining to the 2002 Stock Incentive Plan, as amended and restated, and Employee Stock Purchase Plan, as amended and restated of Ligand Pharmaceuticals Incorporated, and

(5) Registration Statement (Form S-8 No. 333-131029) pertaining to the 2002 Stock Incentive Plan and 2002 Employee Stock Purchase Plan of Ligand Pharmaceuticals Incorporated;

of our reports dated February 27, 2020, with respect to the consolidated financial statements of Ligand Pharmaceuticals Incorporated and the effectiveness of internal control over financial reporting of Ligand Pharmaceuticals Incorporated included in this Annual Report (Form 10-K) of Ligand Pharmaceuticals Incorporated for the year ended December 31, 2019.

/s/ Ernst & Young LLP

San Diego, California
February 27, 2020

Exhibit 31.1

I, John L. Higgins, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ligand Pharmaceuticals Incorporated;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 27, 2020

/s/ John L. Higgins

John L. Higgins
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

I, Matthew Korenberg, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ligand Pharmaceuticals Incorporated;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 27, 2020

/s/ Matthew Korenberg

Matthew Korenberg
Executive Vice President, Finance and Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER

In connection with the Annual Report of Ligand Pharmaceuticals Incorporated (the "Company") on Form 10-K for the year ended December 31, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, John L. Higgins, Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 27, 2020

/s/ John L. Higgins

John L. Higgins
Chief Executive Officer
(Principal Executive Officer)

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. Section 1350, and is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and is not to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing. A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER

In connection with the Annual Report of Ligand Pharmaceuticals Incorporated (the "Company") on Form 10-K for the year ended December 31, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Matthew Korenberg, Executive Vice President, Finance and Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 27, 2020

/s/ Matthew Korenberg

Matthew Korenberg
Executive Vice President, Finance and Chief Financial Officer
(Principal Financial Officer)

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. Section 1350, and is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and is not to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing. A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.